TELOPEA

Journal of Plant Systematics

Vol 13(3)

Pacific cryptogams, with a focus on Fiji

The Royal Botanic Gardens & Domain Trust

National Herbarium of New South Wales

TELOPEA is published by the National Herbarium of New South Wales, Royal Botanic Garden, Sydney. It covers the field of systematic botany in Australia and the Asia-Pacific region, specialising in the flora of New South Wales.

TELOPEA is published twice yearly.

Annual subscription

*Within Australia**
Individuals $66*
Institutions $100*

* *This subscription includes GST.*

Overseas
Individuals $100*
Institutions $160*
(includes postage, surface mail and handling)

Subscriptions start with the first issue of the year.

Subscription details, with a cheque or money order made out to the Royal Botanic Gardens and Domain Trust, should be sent to:

The Administration Officer
The Australian Botanic Garden, Mount Annan
Mount Annan Drive
Mount Annan, NSW 2567, Australia

Website: http://plantnet.rbgsyd.nsw.gov.au/Telopea

Cover Artwork
Main image: *Christella harveyi.* Top image: *Cyathea lunulata.* Photographs by Leon Perrie.

TELOPEA
Journal of Plant Systematics
13(3): 361–619 • 2011

CONTENTS

A brief history of the cryptogams of Fiji and prospects for the future
Matt von Konrat, Alifereti Naikatini, Marika Tuiwawa, Lars Söderström, Allan Fife, Matt Renner, Patrick Brownsey, Leon Perrie, Anders Hagborg, Tamás Pócs, H. Thorsten Lumbsch, John Braggins, Ana Séneca and Elizabeth Brown **361–374**

New records of lichen-forming fungi from Fiji
H. Thorsten Lumbsch, Robert Lücking, Pradeep Divakar, Matt von Konrat and Alifereti Naikatini **375–404**

Checklist of hornworts and liverworts of Fiji
Lars Söderström, Anders Hagborg, Tamás Pócs, Andrea Sass-Gyarmati, Elizabeth Brown, Matt von Konrat and Matt Renner **405–454**

New liverwort (Marchantiophyta) records for the Fiji Islands
Tamás Pócs, Andrea Sass-Gyarmati, Alifereti Naikatini, Marika Tuiwawa, John Braggins, Sarolta Pócs, and Matt von Konrat **455–494**

Significant records of Fijian mosses
Allan J. Fife and Alifereti Naikatini **495–502**

***Sphagnum* of the Pacific — a checklist**
Ana Séneca and Lars Söderström **503–511**

A revised checklist of Fijian ferns and lycophytes
P.J. Brownsey and L.R. Perrie **513–562**

New records, range extensions and descriptions for some unfamiliar Australian Lejeuneaceae (Jungermanniopsida)
Matt A.M. Renner **563–576**

Australian Mosses — new chromosome numbers and a compilation of chromosome data *Helen P. Ramsay* **577–619**

TELOPEA 13(3): 361–619 • 2011

Scientific Editor
Elizabeth Brown
Editor of Publications
Gary Bridle
Typesetting and Production Assistance
Debby McGerty and Julia Sideris
Other members of Editorial Committee
Brett Summerell, Peter Wilson, Barry Conn, Murray Henwood, Marco Durretto, Richard Jobson

ISSN 0312–9764
Telopea 13(1–2) was distributed on 16 February 2011.
National Herbarium of New South Wales
Royal Botanic Garden Sydney
Mrs Macquaries Rd
Sydney NSW Australia 2000

Dedication

The current issue of *Telopea* is dedicated to the staff and students of the South Pacific Regional Herbarium (Institute of Applied Sciences, the University of the South Pacific), particularly Alifereti Naikatini and Marika Tuiwawa, who have provided the tireless and enthusiastic logistical and fieldwork support essential to many of the papers in this issue.

Telopea 13(3) 361–374

A brief history of the cryptogams of Fiji and prospects for the future

Matt von Konrat[1], Alifereti Naikatini[2], Marika Tuiwawa[2], Lars Söderström[3], Allan Fife[4], Matt Renner[5], Patrick Brownsey[6], Leon Perrie[6], Anders Hagborg[1], Tamás Pócs[7], H. Thorsten Lumbsch[1], John Braggins[8] Ana Séneca[3,9], and Elizabeth Brown[5]

[1]*Botany Department, The Field Museum, Chicago, Illinois 60605-2496, U.S.A.*
[2] *South Pacific Regional Herbarium, Institute of Applied Science, Faculty of Science and Technology, University of the South Pacific, Private Bag, Laucala Campus, Suva, Fiji*
[3] *Department of Biology, Norwegian University of Science and Technology, N-7491 Trondheim, Norway*
[4]*Landcare Research, PO Box 40, Lincoln 7640, New Zealand*
[5] *National Herbarium of New South Wales, Royal Botanic Gardens Sydney, NSW, Australia*
[6] *Museum of New Zealand Te Papa Tongarewa, P.O. Box 467, Wellington, New Zealand*
[7] *Botany Department, Eszterházy College, Eger. Pf. 43, H-3301, Hungary*
[8]*Herbarium, The Auckland War Memorial Museum, Private Bag 92018, Auckland 1142, New Zealand*
[9]*Department of Biology, Faculty of Science, University of Porto, Rua Campo Alegre, s/n, P-4169-007 Porto, Portugal*

Abstract

A brief history of Fijian cryptogams, including bryophytes, ferns and lycophytes, and lichenised fungi, is provided. Brief comments on the future prospects for the systematics and conservation of these groups of organisms are provided. An overview of the six Fijian contributions is also provided. In contrast to many other biodiversity hotspots, the current study highlights our limited floristic knowledge of the Fijian cryptogams.

Introduction

The current issue of *Telopea* (volume 13, part 3) is dedicated to bryophytes, ferns and lycophytes, as well as lichenised fungi from the islands of Fiji. These organisms all share the common feature of being spore-bearing and traditionally their members have been classified together and referred to as cryptogams. Although cryptogams do not form a natural monophyletic group, they do share many ecological and physiological traits, and are typically found together in moist habitats. For example, lichens and bryophytes are relatively small organisms (when compared with most land plants) that

© 2011 Royal Botanic Gardens and Domain Trust ISSN0312-9764

often produce species-diverse mats over rock, soil, and tree bark; they are poikilohydric and can survive periods of drought in non-metabolic stages (Bates & Farmer 2002, Cornelissen et al. 2007). Bryophytes, ferns and lycophytes as well as lichenised fungi are of ecological significance in a variety of ecosystems, and participate in key ecological functions such as erosion prevention, plant succession, production of phytomass, decomposition, and are primary producers in the cycling of carbon and nitrogen (Page 1979; Pócs 1980; Longton 1984, 1992; Coxson et al. 1992). Many of these organisms contain compounds with useful biochemical properties such as anti-microbial, anti-fungal, cytotoxic, insect anti-feedant, and muscle relaxing activity (Soeder 1985; Asakawa 1995, 2004). As a source of food and building material, ferns are an important component of Fijian culture. Some notable examples include the use of *Cyathea* in the construction of huts (Bure), and the consumption of palatable ferns (Ota) such as *Acrostichum aureum*, *Coniogramme fraxinea*, *Diplazium* spp. and *Tectaria degeneri* (Parham 1972).

Lichens are classified as fungi (predominately ascomycetes, Nash 2008) whereas bryophytes are related to vascular plants, including ferns and lycophytes (Kenrick & Crane 1997). Neither lichens nor bryophytes are monophyletic. Lichens are a polyphyletic assembly of heterogeneous clades (e.g. Lutzoni et al. 2001, Miadlikowska et al. 2006, Schoch et al. 2009). For bryophytes, there is a broad consensus that its members are a paraphyletic grade of several distinct lineages; i.e. Marchantiophyta (liverworts), Anthocerotophyta (hornworts), and Bryophyta (mosses) (e.g. Mishler & Churchill 1984, Kenrick & Crane 1997, Shaw & Renzaglia 2004, Qiu et al. 2007). Similarly, those plants historically classified as 'pteridophytes' and 'ferns and fern allies'represent a paraphyletic assemblage, including the lycophytes, horsetails, whisk ferns, and all eusporangiate and leptosporangiate ferns (Smith et al. 2006).

Mittermeier et al. (2005) identified all the islands of Micronesia and Polynesia, including the islands of Fiji, as one of 35 global biodiversity 'hotspots', often referred to as the Polynesia-Micronesia hotspot. Conservation International (http://www.wdpa.org, accessed 16 Aug 2011) considers the Polynesia-Micronesia hotspot the epicenter of the current global extinction crisis. Geographically, the islands belong to Melanesia, a subregion of Oceania, which includes New Guinea, the Solomon Islands, Vanuatu, New Caledonia and Fiji but phytogeographically some regard the Fiji group as belonging to Eastern Melanesia with an obvious transition towards Polynesia(Mueller-Dombois & Fosberg 1998). The Fiji Islands comprise a mountainous archipelago of over 300 islands of varying sizes, in the tropical south-west Pacific with a land area of 18 376 km^2, approximately half of which is covered in rain forest (DoE 1997, Heads 2006). The tropical moist forests of Fiji contain the richest and most distinct natural communities of all the oceanic islands of the Pacific, with the exception of New Caledonia (World Wildlife Fund), and more than 60% of the Fijian seed plant flora is considered endemic (Watkins 1994, Heads 2006). Fiji has a complex geology, which is determined by its position between two subduction-zones of opposite polarity, the Vanuatu and Tonga Trenches, in what is currently a region of transform faulting (Heads 2006).

The distribution of many Fijian species can be localised to single islands or mountains, this being a factor regarding vulnerability to human disturbance (Davis et al. 1995). Loss and/or degradation of characteristic ecosystems such as mangroves and lowland rainforest is a consequence of years of logging and land clearing to make way for plantation forests, other agricultural practices, and human habitation (Watling & Chape 1992). Keppel (2005) suggested that there is much to learn regarding the

composition and distribution of plant communities in many areas of Fiji, the urgency of which is compounded when one considers only 1.4% of Fiji is under some form of environmental protection (World Database on Protected Areas, http://www.wdpa.org, accessed 16 Aug 2011). However, the situation is even worse for bryophytes and lichenised fungi. The lack of comprehensive baseline data is exemplified by the total absence of data for bryophytes and lichens in the National Report prepared by the Fijian Department of the Environment (DoE 1997), along with subsequent reports as part of the Convention on Biological Diversity, despite data being produced for vascular plants, invertebrates, birds, and animals.

Brief history of cryptogam exploration

The Fijian islands were not visited by the British and French expeditions of the 18th and early 19th centuries (Brownlie 1977). The earliest major western botanical exploration was by the United States Exploring Expedition in 1840 (Brownlie 1977), which was largely prompted by a desire to obtain information on the South Pacific, an area that was rapidly becoming of interest to American traders and whalers (Engel & Glenny 2008). As noted by Brownlie (1977), none of the explorers in the 18th century, and very few in the early 19th century limited themselves to the study of particular plant groups; thus ferns along with other cryptogams were included due only to the non-specific nature of the botanical collecting. One of the earliest and most significant floristic works devoted to Fiji was *Flora Vitiensis* which was published in ten parts (with colour plates by Walter H. Fitch) and included many new plant genera and species (Seemann 1865–1873). German botanist Berthold Carl Seemann produced the first issue in 1865; nine parts were written by him, but unfortunately Seemann died before the completion of the tenth part, in which he intended to deal with the cryptogamic plants. The final part was instead authored by W. Carruthers (ferns), J. M. Crombie (lichens) and W. Mitten (bryophytes) and issued in 1873 (Stearn 1963).

Bryophytes — Very few publications have focused solely on bryophyte collections from Fiji, especially when compared to all other land plant groups. Moreover, there have been very few bryophyte collections made in Fiji since the end of the Second World War (after 1945).

Based on 1840 collections made by W.D. Brackenridge, the botanist of the United States Exploring (Capt. C. Wilkes) Expedition, Schultze-Motel (1974) noted that the earliest published records of Fijian mosses are apparently those of Sullivant (1854, 1859). Other early collections were made by W. Milne (of the *Herald* expedition under Capt. Denham) in 1856 and by Seemann and Graeffe (c. 1860). All these were incorporated into Mitten's (1873a) treatment of the mosses in Seemann's *Flora Vitiensis*. In the 20th century, Lillian Gibbs (as quoted by Dixon & Greenwood, 1930) reported on montane mosses collected in 1907 from near Tomanivi (Mt Victoria), Viti Levu. From 1917 onwards significant collections from Viti Levu, Vanua Levu, and Ovalau Islands were made by William Greenwood. Greenwood's collections, together with those of a number of less prolific collectors, were summarised in the still useful paper by Dixon & Greenwood (1930) and, after Dixon's death, Greenwood (1945) presented a subsequent paper. Collections by A.C. Smith, made mostly from out-lying islands between 1933 and 1948, O. Degener's collections of 1940–41, and some residual Greenwood collections formed the basis of a series of papers by the American bryologist E.B. Bartram spanning more than two decades (e.g. Bartram 1936, 1948, 1956). These publications form the

core of our current knowledge of the islands' moss flora. They were incorporated into both *Katalog der Laubmoose von Melanesien* (Schultze-Motel 1974) and *A preliminary list of Fijian mosses* (Whittier 1975). Whittier's list, compiled from literature reports, recorded 306 species and varieties in 106 genera from Fiji. *Prodromus Florae Muscorum Polynesiae* (Miller et al. 1978) also incorporated literature records from Fijian islands. It also included an extremely useful key to the genera recorded from its wide area of coverage. Eddy's (1988, 1990, 1996) uncompleted series, *A Handbook of Malesian Mosses,* flora is another valuable resource for the study of Fijian mosses.

Subsequent Fijian collections seem to have been primarily by M. Higuchi and Z. Iwatsuki in 1982 and 1991–92 (see Matsui & Iwatsuki, 1993) and S. & T. Pócs in 2003. A few of Pócs' collections are cited in Pócs et al. (2011, this issue) but many of them remain unstudied. Valuable collections made during trips (Fig. 1, Table 1) by authors of the current paper, i.e. E. Brown, M. Renner, M. von Konrat, J. Braggins, A. Fife and others have also yet to be critically revised, but initial processing indicates many novelties. The Fijian moss flora remains extremely poorly collected and a very large fraction of the species recorded in the past have not yet been critically evaluated. Bartram's (1936) opinion that "further explorations, especially in the higher regions of central Viti Levu" would expand this number considerably remains true today. This is evident with Fife & Naikatini (2011, this issue) recording nine new distributional records for Fiji.

Many of the earliest publications of Fijian liverworts and hornworts were based on collections made by Brackenridge, Milne and Graeffe. Mitten (1861, 1862) described a few new species from Fiji, and afterwards provided a more detailed treatment as part of *Flora Vitiensis* (Mitten 1873b). Later, Jack and Stephani (1894) described several new species based on collections made by Graeffe. Gibbs (1909) reported on 21 liverworts and 2 hornworts from Viti Levu, thus adding many new records to Fiji.

The last significant report on Fijian liverworts and hornworts was produced by Campbell (1971), and was based on collections made by A.C. Smith and W. Greenwood. At that time, Campbell stated that there were still few collections from Fiji, and hoped her work would provide an impetus for further studies. Miller et al. (1983) published a comprehensive checklist of liverworts and hornworts from the tropical islands of the Pacific, including those of Fiji. This work was based on a compilation of literature and served as a first step towards making knowledge about Pacific island bryophytes more accessible. Miller et al. (1983) concluded that the bryophyte flora of the tropical Pacific islands was poorly known and much work remained to be done to produce a useful Flora for the region. There does exist a scattering of publications that have included collections from Fiji as part of other broader geographical, monographic and revisional studies (e.g. the series of papers published by H. Hürlimann on the Hepaticae of Southern Pacific in 14 parts between 1960 and 1998; Eddy 1988, 1990, 1996; Hattori 1985; Iwatsuki & Suzuki 1996; Matsui & Iwatsuki 1993; Schuster & Engel 1985; Thiers 1993; So 2002; von Konrat et al. 2006), but these only cover a fraction of the flora represented in the region.

Ferns and lycophytes — Early works included those of W. Carruthers who provided a synopsis of the ferns, in Seemann's *Flora Vitiensis*, and Brackenridge (1854) who provided an enumeration and description of all the ferns collected during the voyage of the United States Exploring Expedition between 1838 and 1842. Brownlie (1977) noted that Brackenridge reported almost half of the now known flora, which was remarkable considering the difficulties of inland travel at that time. Brownlie (1977)

provided a detailed discussion of the different periods of botanical expeditions, major publications of pteridophytes relating to Fiji and a comprehensive treatment of the group. He treated substantially, c. 30%, more taxa than Copeland (1929) had dealt with (Godley 2000). Since publication of Brownlie's work, 29 species have been added to the Fijian fern flora (Brownsey & Perrie 2011, this issue). During the last 25 years, as in bryology and lichenology, there have been few publications devoted to ferns of Fiji, and many have been part of larger treatments. Some noteworthy publications during that time include Parris (1994), Kramer & Zogg (1988), Kato (1984), Gardner (1997) and Brownsey (1987).

Lichenised fungi — Crombie noted that it was regrettable that the few botanical collectors who had visited Fiji, as in many other regions at the time, "paid so little attention to this interesting class of cryptogams" and that a "rich harvest awaits the researchers of future collectors" (Seemann 1865–1873). Indeed, over 140 years later the lichen flora of Fiji remains extremely poorly known (Lumbsch et al. 2011b, this issue). Very early works on lichens in Fiji include Crombie's enumeration of seven lichen species as part of Seemann's *Flora Vitiensis* (1865–1873), and Krempelhuber (1868) who listed several species in a paper on lichens from the South Pacific with a later record of additional species from Fiji (Krempelhuber 1873). Over recent years, only a few studies have focused specifically on Fijian lichens (Archer 2004, Elix 2001, Lücking et al. 2010, Lumbsch et al. 2009, McCarthy & Elix 2000, Molho et al. 1981). A recently updated checklist of Fijian lichens includes data on 159 species (Elix & McCarthy 1998, 2008).

Enduring impediments

For many groups of organisms there exists a large amount of nomenclatural and distributional data dispersed throughout the literature, as well as undatabased and undocumented information. Together with the lack of critical evaluation of specimens, this presents a major impediment for the documentation and analysis of species richness and distribution patterns, and conservation research at both regional and global scales (von Konrat et al. 2008). However, for some organisms, there has been a strong effort toward synthesizing this information, e.g. http://www.mycology.net — an internet portal for scientists presenting information about the diversity of fungi, and the Early Land Plants Today (ELPT) project — an international consortium of scientists working towards uniting biological data for liverworts and hornworts (von Konrat et al. 2010).

Two kinds of error are often associated with early exploration of the Pacific (and other tropical areas). These have, on occasion, been propagated in the literature by subsequent regional treatments. First, many taxa were identified uncritically as European taxa under various names that are still the basis for many reports, although some have subsequently been rejected. For example, *Riccardia chamedryfolia* is a boreal taxon reported from many areas of the tropics including the Pacific. It was reported from Fiji by Schiffner (1890; as *Aneura pinnatifida*) but that is now rejected (Söderström et al. 2011, this issue). However, for several other taxa, we do not know what they really represent, since we lack recent studies for the area (e.g. *Aneura pinguis*; Söderström et al. 2011, this issue). Secondly, participants on several early expeditions were not very exact in labelling their collections and many specimens now bear erroneous locality details. For example, William Milne who was the botanist collecting on the HMS

Table 1. Brief description of general area and elevation providing an impression of major collecting sites discussed in Fife & Naikatini (2011), Lumbsch et al. (2011b) and Pócs et al. (2011), (all this issue). Precise locality details are provided in the above papers.

Site no.	See authors (this issue)	Island	Year collected	Brief description of general area and elevation (elev.)
1	Pócs et al.	Viti Levu	2003	Margin of Nausori Highlands, secondary submontane rainforest, 600–620 m elev.
2	Pócs et al.	Viti Levu	2003	Southern coast ("Coral Coast"), coastal forest vegetation and lowland fragmented forest, sea level to 60 m elev.
3	Pócs et al.	Viti Levu	2003	North-eastern coast, mosaic of dry semi-deciduous forest, mangrove forest, sea level to 60 m elev.
4	Fife & Naikatini Lumbsch et al. Pócs et al.	Viti Levu	2003, 2008	Central Highlands, Rairaimatuku Plateau, Monasavu area, *Alphitonia–Homalium–Metrosideros–Scaveola–Cyathea* cloud forest with emergent *Dacrydium*, 900–1050 m elev.
5	Pócs et al.	Viti Levu	2008	Naquaranibuluti Nature Reserve, track to Mt Lomalagi, mesic and dry evergreen forest with emergent *Podocarpus neriifolius* and *Agathis vitiensis*, 875 m elev.
6	Fife & Naikatini	Viti Levu	2007	Mt Korobamba, lower slopes, partly shaded volcanic rock in moderately disturbed lowland rainforest with *Spathodea, Ficus, Cyathea, and Dicksonia*, 75 m elev.
7	Fife & Naikatini	Viti Levu	2007	Headwaters of the Nabukavesi R., second-growth lowland rainforest dominated by *Trichospermum* and *Endospermum*, with *Cyathea* and *Angiopteris* understorey, c. 100 m elev.
8	Fife & Naikatini	Viti Levu	2007	Mt Voma, exposed vertical basalt rock face, seepage areas, 800 m elev.
9	Pócs et al.	Taveuni	2003	SE coast, Wainisari Beach near estuary of Wainibau Stream, rocky (volcanic) coastal forest with tree-ferns, intercropped by *Cocos nucifera*). 4–10 m. elev.
10	Pócs et al.	Taveuni	2003	Vicinity of Tavoro Waterfall, cultivated area and degraded lowland rainforest, 10–100 m elev.
11	Fife & Naikatini Lumbsch et al. Pócs et al.	Taveuni	2008	NW slope of Des Voeux (Devo) peak, montane mossy forest, 900–1100 m elev.
12	Pócs et al.	Kadavu	2003	Central part of island, along the Namara Road, slopes of secondary lowland rainforest on lilac volcanic soil, 120–165 m elev.
13	Pócs et al.	Kadavu	2003	Western part of island, slopes and summit of Koroniquala Hill, mesic submontane rainforest with tree-ferns, 250–370 m elev.
14	Pócs et al.	Vanua Levu	2006	Coastal mangrove forest, on the outskirts of Labosa, sea level–5 m.
15	Pócs et al.	Vanua Levu	2006	Waisali Dakua National Trust Forest Reserve, dominated by *Agathis macrophylla*, to 450 m elev.

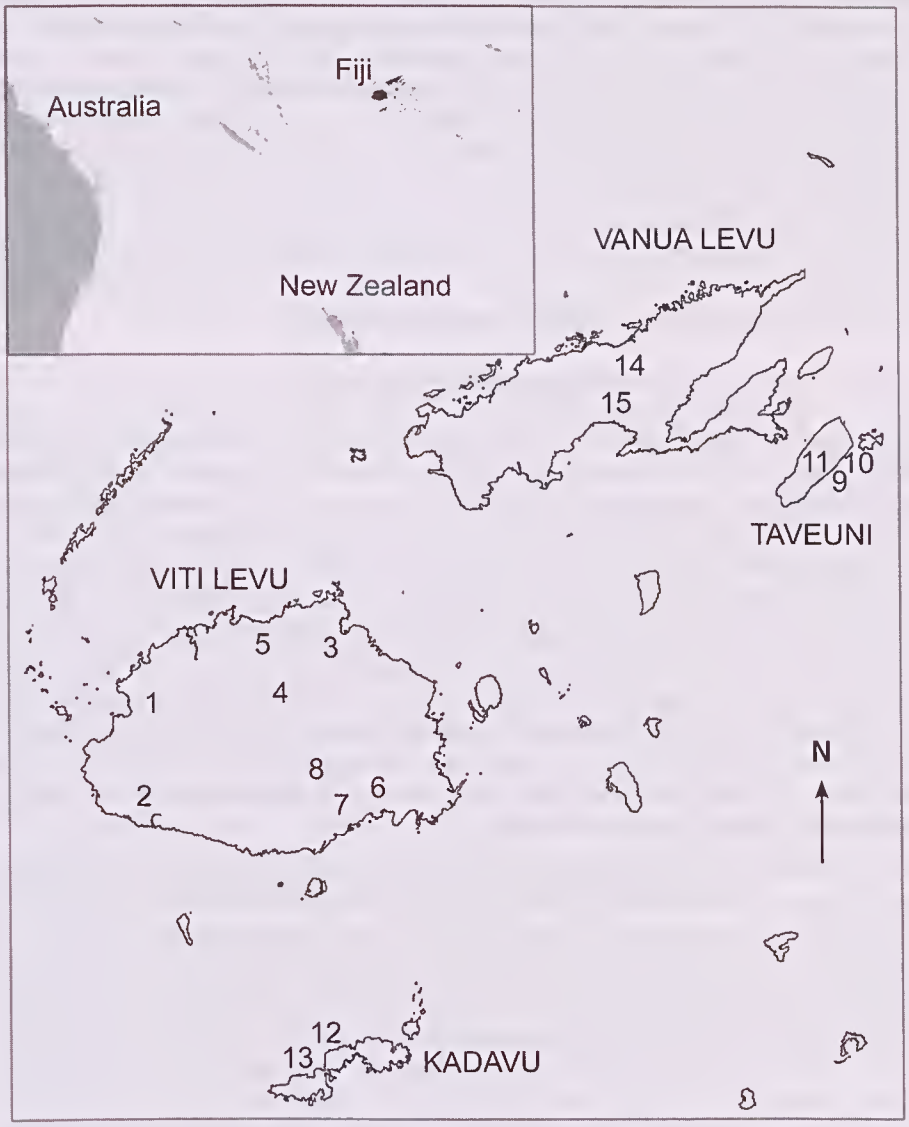

Fig. 1. An overview of major sites on the islands Viti Levu, Vanua Levu and Taveuni visited between 2003 and 2008 by bryologists and lichenologists in the current issue. See Table 1 for a brief description of general area and elevation. Inset of Oceania.

Challenger expedition (1872–1876) that made several visits to Fiji was "apparently a keener collector than he was presser, labeller and cataloguer of plants during the voyage, a fact that probably contributed to his forced resignation at the instigation of Hooker" (Meagher 2003). One example of a report that is probably misplaced is the type of *Sphagnum weberi* Warnst., said to come from Samoa, but there is no locality there to fit the labelling. It seems most likely that the specimen is not from Samoa and could actually be from New Guinea (Séneca & Söderström 2011, this issue). Another problem is the frequent confusion of islands and archipelagoes by the botanists who identified the plants, but had never been to the Pacific and were unfamiliar with the region. Common examples of this kind of confusion are the locality details 'Samoa, Ovalau', which confuses a Fijian island with the Samoan archipelago, or even worse, 'Fiji, Oahu', which confuses a Hawaiian Island with the Fijian archipelago. The latter case might be explained if 'Oahu' is actually a misprint of 'Ovalau', a Fijian Island. Another example is that Mitten (1873a, b) sometimes refers to Hawaii as the Sandwich Islands, and other times as Hawaii, suggesting that he did not know that they are the same.

Prospects for the future

It is clear that Fijian ferns, bryophytes, and lichenised fungi have been overlooked historically, compared to seed plants, birds, and other organisms in Fiji, forming a remarkable gap in the flora of Fiji. Moreover, the state of our floristic knowledge of these organisms is deficient compared to many other biodiversity hotspots and other ecologically significant areas of the globe. This is particularly alarming as Conservation International identified the islands of the South Pacific as the "epicenter of the global extinction crisis", largely because of the high proportion of extinct species and habitat loss (http://www.conservation.org/where/priority_areas/hotspots/asia-pacific, accessed 16 Aug 2011). The flora of the Fijian islands has also received very little attention in comparison to the two developed countries of the South Pacific — Australia and New Zealand — as well as other large islands in the region, e.g. New Caledonia. Dedicated study of cryptogams from Fiji would thus increase the regional knowledge of these elements of the flora.

The immediate future looks promising as several international and national agencies have recently identified and financially supported the critical need to investigate these organisms, e.g. Conservation International, National Geographical Exploration and Research, the New Zealand Agency for International Development and the Warwick Foundation. Funding opportunities also present a strong foundation to develop and foster capacity building with Fijian scientists, which is essential to the long-term sustainability of documenting the biodiversity of cryptogams across the islands. It seems evident from the 180 new records, and the recent discovery of species new to science, that the islands of Fiji require further botanical exploration (e.g. Pócs 2008a, b; Pócs et al. 2011, this issue; Lumbsch et al. 2010, 2011b, this issue).

Their vast morphological diversity, phylogenetic importance, and key roles in the ecosystems of the world, make bryophytes, lichens and ferns useful objects of study in many interesting and new avenues of study. Continued field programs and collecting activities focused on these organisms will have broad ramifications. Carefully designed research in Fiji has the potential to serve as a model for similar survey work in other islands of the South Pacific, help develop local scientific expertise, and greatly facilitate study of these organisms beyond taxonomy and biodiversity, such as their application

to conservation. Development of local scientific expertise and capacity-building will be particularly important in enhancing research on these overlooked organisms. Training of, and collaboration with, scientists in Fiji will enable them to make scientifically informed assessments of different ecosystems, and contribute to training programs in applications of these organisms to conservation science. The islands of Fiji represent areas of varying geological ages and history and provide a promising venue for the study of biogeographical patterns of selected cryptogam groups. Bryophyte species composition and their distribution over time have been used in the past to determine the size and shape of forest patches necessary for the maintenance of interior forest conditions (Sillet et al. 1995) and as potential indicators of large scale changes to an ecosystem (Gignac 2001). Field programs in Fiji could also contribute to exploring the functional role of cryptogams in tropical ecosystems, their use and application as bioindicators of forest degradation, land use change, and conservation.

Synopsis of current issue

The lack of data for cryptogams in Fiji is significant and thus the papers presented in this issue of *Telopea* are of particular importance. The issue contains six papers on Fijian cryptogams, two focused on mosses, two on liverworts and hornworts, one devoted to ferns and another to lichenised fungi. Séneca & Söderström on *Sphagnum*, provide an overview of the six taxa recorded for the Pacific Islands (two from Fiji) and there is a report on 17 interesting mosses from Fiji by Fife, including new distributional information for nine species. Pócs et al. provide a report of 48 species of liverworts new to the Fiji Islands and new island distributions for an additional 39 taxa. Söderström et al. provide a detailed and comprehensive checklist of liverworts and hornworts including 289 taxa, with annotations and notes; a vital entry point to assess the biodiversity of these organisms in all future studies. An annotated and revised checklist of 331 species of Fijian ferns and lycophytes is presented by Brownsey & Perrie, the first updated checklist published in over three decades. Lumbsch et al. report 66 lichenised fungi species from the Fijian archipelago for the first time, including a remarkable 19 additional genera. Diagnostic features and distribution areas are given for each species. We anticipate the issue will contribute to further research as well as assisting more students in the study and enjoyment of these intriguing organisms.

Two papers on Australian bryophytes also provide an interesting perspective on the state of knowledge in a more resourced and studied country from the region. Ramsay summarises current knowledge on meiotic chromosome numbers; some 180 collections, comprising 80 species in 57 genera of Australian mosses. Renner provides valuable range extension and new records for seven taxa of Lejeuneaceae.

Acknowledgments

The financial assistance of the National Geographic Committee for Research and Exploration (Grant No. 8247-07), GBIF Seed Money Award No. 2007/41, Critical Ecosystem Partnership Fund, Warwick Foundation, the New Zealand Agency for International Development and an anonymous donor are gratefully acknowledged. The authors also gratefully acknowledge the anonymous referees who greatly improved the paper.

References

Archer AW (2004) Additions to the lichen flora of Fiji and Vanuatu based on Graphidaceae in the Wilson FRM collection at the National Herbarium of New South Wales. *Telopea* 10: 771–776.

Asakawa Y (1995) Chemical constituents of Hepaticae. Pp. 1–562 in Herz W, Kirby GW, Moore RE, Steglich W & Tann C (eds) *Progress in the Chemistry of Organic Natural Products*, vol. 65. (Springer: Wein).

Asakawa Y (2004) Chemosystematics of the Hepaticae. *Phytochemistry* 65: 623–669.

Bates JW & Farmer AM (1992) Bryophytes and lichens in a changing environment. (Clarendon Press: Oxford).

Bartram EB (1936) Contribution to the mosses of Fiji. *Bishop Museum Occasional Papers* 11: 1–30.

Bartram EB (1948) Additional Fijian mosses. *Bishop Museum Occasional Papers* 19: 219–231.

Bartram EB (1956) Additional Fijian mosses III. *Journal of the Washington Academy of Sciences* 46: 392–396.

Brackenridge WD (1854) United States Exploring Expedition, Volume XVI – Botany – Filices (By Authority of Congress, C. Sherman, Philadelphia, Pennsylvania).

Brownlie G (1977) *The pteridophyte flora of Fiji*. (Cramer: Vaduz).

Brownsey PJ (1987) A review of the fern genus *Hypolepis* (Dennstaedtiaceae) in the Malesian and Pacific regions. *Blumea* 32: 227–276.

Brownsey PJ & Perrie LR (2011) A revised Checklist of Fijian ferns and lycophytes. *Telopea* 13: 513–562.

Campbell EO (1971) Liverworts collected in Fiji by Smith AC & Greenwood W. *Journal of the Royal Society of New Zealand* 1: 7–30.

Copeland EB (1929) Ferns of Fiji. *Bernice P. Bishop Museum Bulletin* 59: 1–105.

Cornelissen JHC, Lang SI, Soudzilovskaia NA & During HJ (2007) Comparative cryptogam ecology: a review of bryophyte and lichen traits that drive biogeochemistry. *Annals of Botany* 99: 987–1001.

Coxson DS, McIntyre DD & Vogel HJ (1992) Nutrient release from epiphytic bryophytes in tropical montane rain forest. *Canadian Journal of Botany* 69: 2122–2129.

Crandall-Stotler B & Stotler RE (2000) Morphology and classification of the Marchantiophyta. Pp. 21–70 in Shaw AJ & Goffinet B (eds) *Bryophyte Biology*. (Cambridge University Press: Cambridge).

David A (1995) *The Voyage of HMS Herald to Australia and the South-west Pacific 1852–1861 under the command of Captain Henry Mangles Denham*. (Miegunyah Press).

Davis SD, Heywood VH & Hamilton AC (1995) *Centres of plant diversity: a guide and strategy for their conservation. Vol. 2 Asia, Australasia, and the Pacific*. (WWF and IUCN: Cambridge, UK).

Dixon HN & Greenwood W (1930) The Mosses of Fiji. *Proceedings of the Linnean Society of New South Wales* 55: 261–302.

DoE (Department of the Environment) (1997) *Convention on Biological Diversity 1997. National Report to the Conference of the Parties by the Republic of Fiji*. (Department of the Environment, Ministry of Local Government, Housing and Environment: Suva, Fiji).

Eddy A (1988) *A Handbook of Malesian Mosses*. Vol. 1. Sphagnales to Dicranales. (Natural History Museum: London).

Eddy A (1990) *A Handbook of Malesian Mosses*. Vol. 2. Leucobryaceae to Buxbaumiaceae. (Natural History Museum Publications: London).

Eddy A (1996) *A Handbook of Malesian Mosses*. Vol. 3. Splachnobryaceae to Leptostomataceae. (Natural History Museum and HMSO, London).

Elix JA (2001) Additional lichen records from Oceania 7. Parmeliaceae from Fiji. *Australasian Lichenology* 48: 34–37.

Elix JA & McCarthy PM (1998) Catalogue of the lichens of the smaller Pacific islands. *Bibliotheca Lichenologica* 70: 1–361.

Elix JA & McCarthy PM (2008) Checklist of Pacific Island Lichens. Australian Biological Resources Study, Canberra. Version 21 August 2008. [Accessed at http://www.anbg.gov.au/abrs/lichenlist/PACIFIC_introduction.html]

Engel JJ & Glenny D (2008) A Flora of the Liverworts and Hornworts of New Zealand, vol. 1, 897 p.p. (Missouri Botanical Garden Press: St. Louis).

Fife AJ & Naikatini A (2011) Significant records of Fijian mosses. *Telopea* 13: 495–502.

Gardner RO (1997) A concise account of *Selaginella* in Fiji. *New Zealand Journal of Botany* 35: 269–281.

Gargas A, DePriest PT, Grube M & Tehler A (1995). Multiple origins of lichen symbioses in Fungi suggested by SSU rDNA phylogeny. *Science*. 268: 1492–1495.

Gibbs LS (1909) A contribution to the montane flora of Fiji (including Cryptogams), with ecological notes. *Journal of the Linnean Society, Botany* 39: 130–212.

Gignac LD (2001) New frontiers in bryology and lichenology: Bryophytes as indicators of climate change. *The Bryologist* 104: 410–420.

Godley EJ (2000) Biographical Notes (39): Garth Brownlie (1920–1986). *New Zealand Botanical Society Newsletter* 61 (September): 26–28.

Greenwood W (1945) Notes on some Fijian mosses. *Proceedings of the Linnean Society of New South Wales* 70: 213–218.

Hattori S (1985) A small collection of *Frullania* and *Porella* (Hepaticae) made on Viti Levu, Fiji Islands. *Bulletin of the National Science Museum, Tokyo. Series B, Botany* 11: 11–17.

Heads M (2006) Seed plants of Fiji: an ecological analysis. *Biological Journal of the Linnean Society 89: 407–431.*

Iwatsuki Z & Suzuki T (1996) *Fissidens* in the Fiji Islands. *Journal of the Hattori Botanical Laboratory* 79: 139–162.

Jack JB & Stephani F (1894) Hepaticae in insulis Vitiensibus et Samoanis a Dre Ed. Graeffe anno 1864 lectae. *Botanisches Centralblatt* 60: 97–109.

Kato M (1984) A taxonomic study of the athyrioid fern genus *Deparia* with main reference to the Pacific species. *Journal of the Faculty of Science, University of Tokyo*, sect. III, 13: 375–429.

Kenrick P & Crane PR (1997) The origin and early evolution of plants on land. *Nature* 389: 33–39.

Keppel G (2005) Botanical studies within the PABITRA Wet-Zone Transect, Viti Levu, Fiji. *Pacific Science* 59: 165–174.

Kramer KU & Zogg E (1988) *Pseudophegopteris* (Thelypteridaceae) in Fiji, a new record and a new species. *Blumea* 33: 423-426.

Krempelhuber A (1868) Exotische Flechten aus dem Herbar des k.k. botanischen Hofkabinetes in Wien. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien. Vienna* 18: 303–330.

Krempelhuber AV (1873) Beitrag zur Kenntniss der Lichenen-Flora der Südsee-Inseln. *Journal des Museum Godeffroy, Geographische, ethnographische und naturwissenschaftliche Mittheilungen* 1: 93–110.

Longton RE (1984) The role of bryophytes in terrestrial ecosystems. *Journal of the Hattori Botanical Laboratory* 55: 147–163.

Longton RE (1992) The role of bryophytes and lichens in terrestrial ecosystems. Pp. 32–76 in Bates JW & Farmer AM *Bryophytes and Lichens in a Changing Environment.* (Clarendon Press: Oxford).

Lücking R, Lumbsch HT & von Konrat M (2010) *Graphis collinsiae* (Ascomycota: Graphidaceae), a new lichen species from the Fiji Islands. *Bryologist* 113: 356–359.

Lumbsch HT, Papong K & Naikatini A (2009) A new terricolous species of *Gyalidea* (Gomphillaceae, Ascomycota) from Fiji. *Nova Hedwigia* 88: 111–116.

Lumbsch HT, Divakar PK, Messuti MI, Mangold A & Lücking R (2010) A survey of thelotremoid lichens (Ascomycota: Ostropales) in subantarctic regions excluding Tasmania. *Lichenologist* 42: 203–224.

Lumbsch HT, Ahti T, Altermann S, Amo G, Aptroot A, Arup U, Barcenas Peña A, Bawingan PA, Benatti MN, Betancourt L, Björk CR, Boonpragob K, Brand M, Bungartz F, Caceres M, Candan M, Chaves JL, Clerc P, Common R, Coppins BJ, Crespo A, Dal Forno M, Divakar PK, Duya MV, Elix JA, Elvebakk A, Fankhauser J, Farkas E, Ferraro LI, Fischer E, Galloway DJ, Gaya E, Giralt M, Goward T, Grube M, Hafellner J, Hernández J, Herrera-Campos MA, Kalb K, Kärnefelt I, Kantvilas G, Killmann D, Kirika P, Knudsen K, Komposch H, Kondratyuk S, Lawrey JD, Mangold A, Marcelli MP, McCune B, Michlig A, Miranda Gonzalez R, Moncada B, Naikatini A, Nelsen MP, Øvstedal DO, Palice Z, Papong K, Parnmen S, Pérez-Ortega S, Printzen C, Rico VJ, Rivas Plata E, Robayo J, Rosabal D, Ruprecht U, Salazar Allen N, Sancho L, Santos de Jesus L, Santos Vieira T, Schultz M, Seaward MRD, Sérusiaux E, Schmitt I, Sipman HJM, Sohrabi M, Sochting U, Søgaard MZ, Sparrius L, Spielmann AA, Spribille T, Sutjaritturakan J, Thammathaworn A, Thell A, Thor G, Thüs H, Timdal E, Truong C, Türk R, Umaña Tenorio L, Upreti DK, van den Boom P, Vivas Rebuelta M, Wedin M, Will-Wolf S, Wirth V, Wirtz N, Yahr R, Yeshitela K, Ziemmeck F, Lücking R (2011a) One hundred new species of lichenized fungi: a signature of undiscovered global diversity. *Phytotaxa* 18: 1–127.

Lumbsch HT, Lücking R, Divakar PK, von Konrat M & Naikatini A (2011b) New records of lichen-forming fungi from Fiji. *Telopea* 13: 375–404.

Lutzoni F, Pagel M & Reeb V (2001) Major fungal lineages are derived from lichen symbiotic ancestors. *Nature* 41: 937–940.

Matsui T & Iwatsuki Z (1993) *Callicostaceae* and *Daltoniaceae* (Hookeriales, Musci) from Fiji and Vanuatu. *Hikobia* 11: 281–284.

McCarthy PM & Elix JA (2000) Additional lichen records from Oceania 4. Some pyrenolichens in Fiji. *Australasian Lichenology* 46: 40–42.

Meagher D (2003) Bryophyte records. *Australasian Bryological Newsletter* 48: 8–10.

Miadlikowska J, Kauff F, Hofstetter V, Fraker E, Grube M, Hafellner J, Reeb V, Hodkinson BP, Kukwa M, Lücking R, Hestmark G, Otalora MG, Rauhut A, Büdel B, Scheidegger C, Timdal E, Stenroos S, Brodo I, Perlmutter GB, Ertz D, Diederich P, Lendemer JC, May P, Schoch CL, Arnold AE, Gueidan C, Tripp E, Yahr R, Robertson C & Lutzoni F (2006) New insights into classification and evolution of the *Lecanoromycetes* (Pezizomycotina, Ascomycota) from phylogenetic analyses of three ribosomal RNA and two protein-coding genes. *Mycologia* 98: 1088–1103.

Miller HA, Whittier HO & Whittier BA (1978) *Prodromus Florae Muscorum Polynesiae. Bryophtorum Biblotheca* 16: 1–334.

Miller HA, Whittier HO & Whittier BA (1983) Prodromus Florae Hepaticarum Polynesiae. *Bryophytorum Bibliotheca* 25: 1–423.

Mishler BD & Churchill SP (1984) A cladistic approach to the phylogeny of the "bryophytes." *Brittonia* 36: 406–424.

Mitten W (1861) Musci et Hepaticae Vitiensis. *Bonplandia* 9: 365–367.

Mitten W (1862) Musci et Hepaticae Vitiensis. *Bonplandia* 10: 19.

Mitten W (1873a) Musci. Pp. 378–404 in Seemann B (ed), *Flora vitiensis*. (Reeve: London).

Mitten W (1873b) Jungermanniae and Marchantiae. Pp. 325–453 in Seeman B (ed.), *Flora vitiensis*. (Reeve: London).

Mittermeier RA, Robles GP, Hoffman M, Pilgrim J, Brooks T, Goettsch C, Mittermeier JL & Da Fonseca GAB (2005) Hotspots revisited: Earth's biologically richest and most threatened terrestrial ecoregions (Conservation International: Chicago)

Molho DM, Bodo B, Culberson WL & Culberson CF (1981) A chemically distinctive new *Ramalina* from Fiji. *The Bryologist* 84: 396–398.

Mueller-Dombois D & Fosberg FR (1998) Vegetation of the Tropical Pacific Islands. Ecological Studies Vol. 132. (Springer-Verlag: New York).

Nash TH (2008) Lichen sensitivity to air pollution. Pp. 299–314. *Lichen Biology* (2nd edition) (Cambridge University Press: Cambridge, UK)

Page CN (1979) The diversity of ferns. An ecological perspective. Pp. 10–57 in Dyer AF (ed.) *The Experimental Biology of Ferns* (Academic Press: London).

Parham JW (1972) *Plants of the Fiji Islands*. Revised edition. (Government Printer, Suva).
Parris BS (1994) Additions to the pteridophyte flora of Taveuni, Fiji. *Fern Gazette* 14: 255–258.
Pócs T (1980) The epiphytic biomass and its effect on the water balance of two rain forest types in the Uluguru Mountains (Tanzania, East Africa). *Acta Botanica Academiae Scientiarum Hungaricae* 26: 143–167.
Pócs T (2008a) Bryophytes from the Fiji Islands, IV. The genus *Frullania* Raddi (Jungermanniopsida), 1., with description of *F. vivipara* Pócs, spec. nov. *Fieldiana, Botany* 47: 147–158.
Pócs T (2008b) Bryophytes from the Fiji Islands, III. The genus *Phaeolejeunea* Mizut. (Lejeuneaceae), with detailed description of *P. amicorum* (Hürl.) Pócs, stat. nov. *Fieldiana, Botany* 47: 139–145.
Pócs T, Sass-Gyarmati A, Naikatini A, Braggins J, Renner, M. & von Konrat M (2011) New liverwort (Marchantiophyta) records for the Fiji Islands. *Telopea* 13: 455–494.
Qiu Y-L, Li L, Wang B, Chen, Z, Dombrovska O, Lee J , Kent L, Li R, Jobson RW, Hendry TA, Taylor DW, Testa CM, & Ambros M (2007) A non-flowering land plant phylogeny inferred from nucleotide sequences of seven chloroplast, mitochondrial and nuclear genes. *International Journal of Plant Sciences* 168: 691–708.
Schiffner V (1890) Lebermoose (Hepaticae), mit Zugrundelegung der von Dr. A. C. M. Gottsche ausgeführten Vorarbeiten. Pp. 1–45 in Naumann FC (ed.) *Die Forschungsreise S. M. S. "Gazelle" in der Jahren 1874 bis 1877 unter Kommando des Kapitän zur See Freiherrn von Schleinitz, Vol. IV*. (Berlin).
Schoch CL, Crous PW, Groenewald JZS, Boehm EWA, Burgess TI, et al. (2009) A class-wide phylogenetic assessment of *Dothideomycetes*. *Studies in Mycology* 64: 1–15.
Schultze-Motel W (1974) Die Moose der Samoa-Inseln. *Willdenowia* 7: 333–408.
Schuster RM & Engel J (1985) Austral Hepaticae V(2). Temperate and subantarctic *Schistochilaceae* of Australasia. *Journal of the Hattori Botanical Laboratory* 58: 255–539.
Seemann E (1865–1873) Flora Vitiensis: a description of the plants of the Viti or Fiji islands, with an account of their history, uses, and properties. (MacMillan Company: London).
Séneca A & Söderström L (2011) *Sphagnum* of the Pacific. *Telopea* 13: 503–511.
Shaw AJ & Renzaglia KS (2004) Phylogeny and diversification of bryophytes. *American Journal of Botany* 91: 1557–1581.
Sillet SC, Gradstein SR & Griffin D (1995) Bryophyte diversity of *Ficus* tree crowns from cloud forest and pasture in Costa Rica. *The Bryologist* 98: 251–260.
Smith AR, Pryer KM, Schuettpelz E, Korall P, Schneider H & Wolf PG (2006) A classification for extant ferns. *Taxon* 55: 705–731.
So ML (2002) The Genus *Porella* (Porellaceae, Hepaticae) in Australasia and the South Pacific. *Systematic Botany* 27: 4–13.
Söderström L, Hagborg A, Pócs T, Sass-Gyarmati A, Brown E, von Konrat M & Renner M (2011) Checklist of hornworts and liverworts of Fiji. *Telopea* 13: 405–454.
Soeder RW (1985) Fern constituents: including occurrence, chemotaxonomy and physiological activity. *Botanical Review* 51: 442– 536.
Stearn WT (1963) "Seemann's 'Flora Vitiensis' (1865-73)". *Journal of the Society for the Bibliography of Natural History* 4: 151–152.
Sullivant W (1854) Notices of some new species of mosses from the Pacific Islands. *Proceedings of the American Academy of Arts and Sciences* 3: 73–81.
Sullivant W (1859) Musci. In: United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842 under the command of Charles Wilkes, U.S.N. 17: 1–112.
Thiers BM (1993) A monograph of *Pleurozia* (Hepaticae, Pleuroziaceae). *The Bryologist* 96: 517–554.
von Konrat MJ, Braggins JE, Asakawa Y & Toyota M (2006) *Frullania chevalieri* (Jubulaceae) in New Zealand, with a reassessment of *Schusterella*. *The Bryologist* 109: 141–156.

von Konrat M, Renner MAM, Söderström L, Hagborg A & Mutke J (2008) Early Land Plants Today: Liverwort species diversity and the relationship with higher taxonomy and higher plants. *Fieldiana, Botany* 47: 91–104.

von Konrat M, Söderström L & Hagborg A (2010) The Early Land Plants Today project: A community-driven effort and a new partnership with Phytotaxa. *Phytotaxa* 9: 11–21.

Watkins AJ (1994) A biogeographic database for seed plants of Fiji, a preliminary communication. *South Pacific Journal of Natural Science* 14: 75–96.

Watling D & Chape SA (1992) Environment Fiji - the National IUCN (World Conservation Union: Suva, Fiji).

Whittier HO (1975) A preliminary list of Fijian mosses. *Florida Science* 38: 85–106.

Manuscript received 19 January 2011, accepted 22 August 2011

Telopea 13(3) 375–404

New records of lichen-forming fungi from Fiji

H. Thorsten Lumbsch[1], Robert Lücking[1], Pradeep Divakar[2], Matt von Konrat[1] and Alifereti Naikatini[3]

[1] *Department of Botany, The Field Museum, 1400 S. Lake Shore Drive, Chicago, IL 60605, USA*
[2] *Departamento de Biología Vegetal II, Facultad de Farmacia, Universidad Complutense de Madrid, Plaza de Ramón y Cajal s/n, 28040 Madrid, Spain*
[3] *Institute of Applied Science, Faculty of Science and Technology, University of the South Pacific, Private Bag, Laucala Campus, Suva, Fiji*

Abstract

Sixty-six species are recorded for the first time from the Fijian archipelago. Diagnostic features and distribution areas are given for each species reported here. The genera *Bactrospora, Badimia, Baeomyces, Calenia, Coccotrema, Dibaeis, Gyalectidium, Gyalideopsis, Lecanora, Lepraria, Leucodecton, Megalospora, Melanotopelia, Pannaria, Peltigera, Pyxine, Strigula, Thalloloma,* and *Thelotrema* are reported here from Fiji for the first time. The majority of new records belong to pan- or palaeo-tropical species, in addition to cosmopolitan, Australasian and Indo-Pacific elements.

Introduction

The Fijian archipelago is located in the tropical south-west Pacific, between 15° and 22° S and 177°W and 175° E. It is made up of more than 300 oceanic islands, covering a total land area of 18,376 km². Fiji's tropical maritime climate is influenced by the south-east trade winds and together with rugged topography and mountain ranges in the main islands that rise up to 1300 m provide suitable habitats for lichens both on the leeward and windward sides. These habitats include cloud forests, upland tropical rainforest, lowland tropical rainforest, dry forests, mangrove forests and coastal forests to name a few. Heads (2006) gives a summary of the recent floristic accounts in Fiji where all the major groups have been covered, an uncommon phenomenon in the wet tropical countries of the world. However, only the pteridophytes and seed plants have been treated in any detail and this is not so for the lower plants and fungi. Also there have only been a few vegetation and ecological studies in Fiji in the past (Keppel 2005).

The lichen flora of Fiji is currently poorly known. Krempelhuber (1873) listed several lichens in a paper on lichens from the South Pacific and later Zahlbrucker (1896) recorded additional species from the archipelago. Only a few recent

© 2011 Royal Botanic Gardens and Domain Trust

studies have specifically focused on Fijian lichens (Archer 2004, Elix 2001, Lücking et al. 2010, Lumbsch et al. 2009, McCarthy & Elix 2000, Molho et al. 1981). A recently updated checklist of Fijian lichens includes 159 species (Elix & McCarthy 1998, 2008).

On a joint expedition to Fiji in 2008 organised by Matt von Konrat (The Field Museum, Chicago), the first author collected lichens in the highlands of Taveuni and Viti Levu (Fiji). A map showing the locations of the localities is found in von Konrat et al. (2011, this issue). The following list includes 66 new records for the Fijian archipelago, which brings the number of lichen species known from Fiji to 225. This contribution adds 19 further genera to the lichen flora of Fiji.

New records

Amandinea melaxanthella (Nyl.) Marbach, *Bibl. Lichenol.* 74: 87 (2000)

Illustration: Fig. 1A.

Distribution: pantropical (Marbach 2000).

Notes: this species is characterised by multi-spored asci, small ascospores, and the presence of the arthothelin chemosyndrome (Marbach 2000).

Specimens examined: Fiji: Taveuni: Coconut Research Station, altitude 24 m, on *Cocos nucifera*, *Lumbsch 19809c* (F, SUVA).

Anisomeridium ubianum (Vain.) R.C.Harris, *More Florida Lichens*: 151 (1995)

Illustration: Fig. 1B.

Distribution: Indo-Pacific (Harada 2001, Harris 1995).

Notes: this corticolous species is characterised by dark, hemispherical to dome-shaped ascomata, lateral to subapical ostioles, and relatively large ascospores (Harada 2001).

Specimens examined: Fiji: Viti Levu: Nadi area, close to Navisabasaba village, on road to Naduga from Nadi, mangrove, altitude 2 m, on mangrove, *Lumbsch 19845j* (F, SUVA).

Bactrospora metabola (Nyl.) Egea & Torrente, *Mycotaxon* 53: 58 (1995)

Illustration: Fig. 1C.

Distribution: Indo-Pacific (Egea & Torrente 1995).

Notes: *Bactrospora metabola* is characterised by 4–8-spored, pyriform, wide asci and muriform ascospores (Egea & Torrente 1995).

Specimens examined: Fiji: Viti Levu: Nadi area, close to Navisabasaba village, on road to Naduga from Nadi, mangrove, altitude 2 m, on mangrove, *Lumbsch 19845h* (F, SUVA).

Badimia elegans (Vain.) Vězda, *Folia Geobot. Phytotax.* 21: 215 (1986)

Illustration: Fig. 1D.

Distribution: Indo-Pacific (Santesson 1952).

Notes: this *Badimia* species, which belongs to the nominal section with vividly coloured apothecia with opaque discs and thick margins (Lücking 2008), has orange-red apothecia, 3-septate ascospores, and a smooth thallus surface (Santesson 1952).

Specimens examined: Fiji: Viti Levu: Nadarivatu Nature Reserve, secondary forest at

road to Koro'o, secondary forest dominated by *Agathis* and *Podocarpus*, altitude 750 m, on leaves, *Lumbsch 19852a* (F, SUVA).

Baeomyces heteromorphus Nyl. ex C. Bab. & Mitt., in Hooker, *Flora Tasman.* 2: 351 (1860)

Illustration: Fig. 1E.

Distribution: this Australasian species has previously been known from mainland Australia, New Guinea, New Zealand, and Tasmania (Galloway 1980, 2007; Johnston 2001, Streimann 1986).

Notes: this variable species is characterised by a greenish-grey corticate thallus, brownish apothecial discs, non-septate, hyaline ascospores, and the presence of the norstictic acid chemosyndrome (Galloway 1980, Johnston 2001).

Specimens examined: Fiji: Viti Levu: Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, cloud forest, altitude 1200 m, on soil, *Lumbsch 19832a, c*; *19839c, d* (F, SUVA).

Brigantiaea leucoxantha (Spreng.) R.Sant. & Hafellner, in Hafellner & Bellemère, *Nova Hedwigia* 35: 246 (1982)

Illustration: Fig. 1F.

Distribution: pantropical (Hafellner 1997).

Notes: this is a non-sorediate, corticolous taxon with a hyaline to yellowish hypothecium and orange crystals in the exciple (Hafellner 1997).

Specimens examined: Fiji: Taveuni: Access road to summit of Devo Peak, altitude 700 m, montane relict forest at roadside, on bark, *Lumbsch 19804d* (F, SUVA).

Byssoloma leucoblepharum (Nyl.) Vain., *Dansk Bot. Ark.* 4(11): 23 (1926)

Illustration: Fig. 2A.

Distribution: pantropical (Lücking 2008).

Notes: this taxon has a dark greenish grey thallus, a dark grey-brown apothecial disc, well-developed exciple lacking crystals, and 3-septate ascospores (Lücking 2008).

Specimens examined: Fiji: Viti Levu: Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 1200 m, cloud forest, on leaves, *Lumbsch 19835a* (F, SUVA).

Calenia depressa Müll.Arg., *Lich. Epiphylli Novi*: 4 (1890)

Illustration: Fig. 2B.

Distribution: pantropical (Lücking 2008).

Notes: this taxon is distinguished from similar *Calenia* spp. by having dark grey apothecial discs, and usually 7-septate ascospores (Lücking 2008).

Specimens examined: Fiji: Taveuni: Bouma Falls, altitude 10 m, relict forest, on leaves, *Lumbsch 19816a* (F, SUVA). Viti Levu: Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, cloud forest, on leaves, *Lumbsch 19835f* (F, SUVA).

Chrysothrix xanthina (Vain.) Kalb, *Bibl. Lichenol.* 78: 144 (2001)

Illustration: Fig. 2C.

Distribution: pantropical (Kalb 2001).

Notes: this yellow, leprose species differs from the morphologically similar *Chrysothrix*

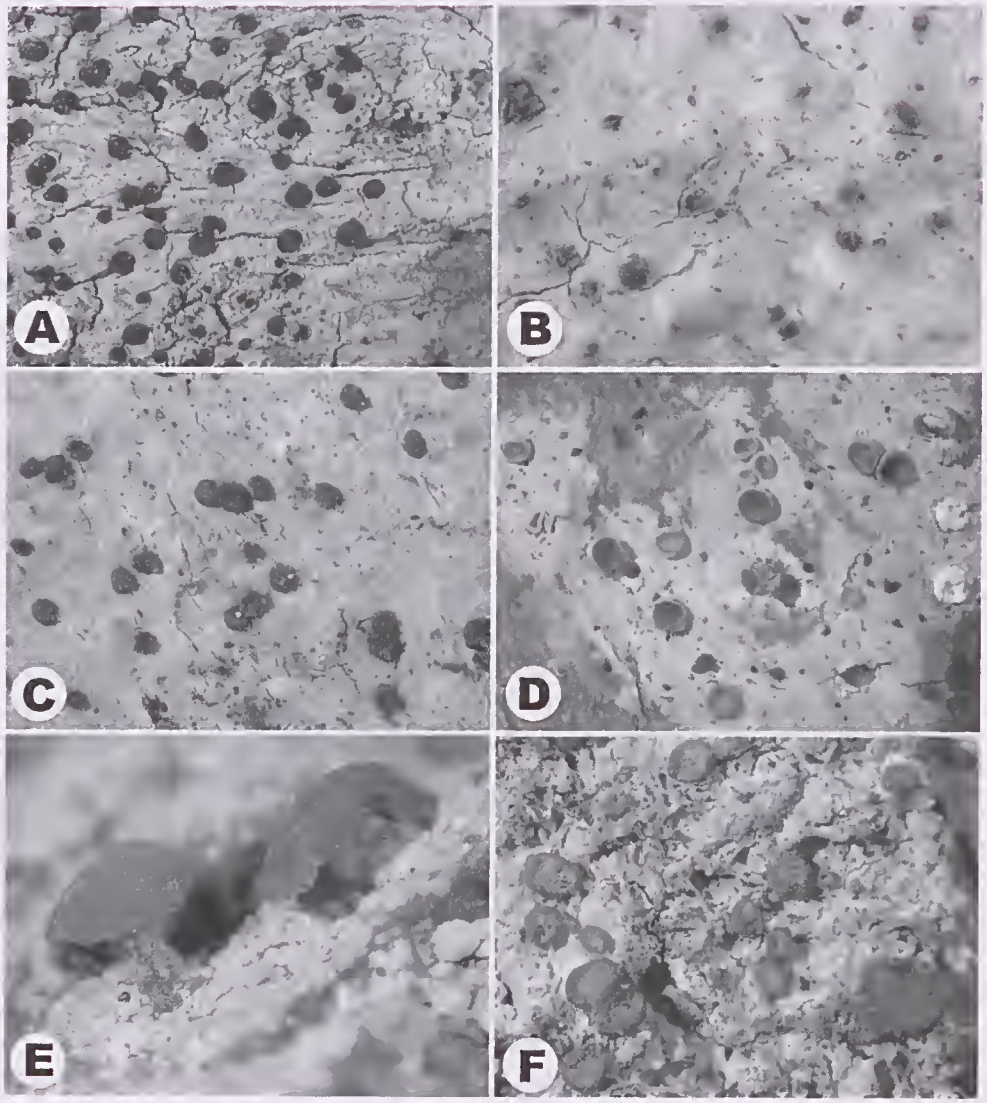

Fig. 1. A, *Amandinea melaxanthella.* **B,** *Anisomeridium ubianum.* **C,** *Bactrospora metabola.* **D,** *Badimia elegans.* **E,** *Baeomyces heteromorphus.* **F** *Brigantiaea leucoxantha.*

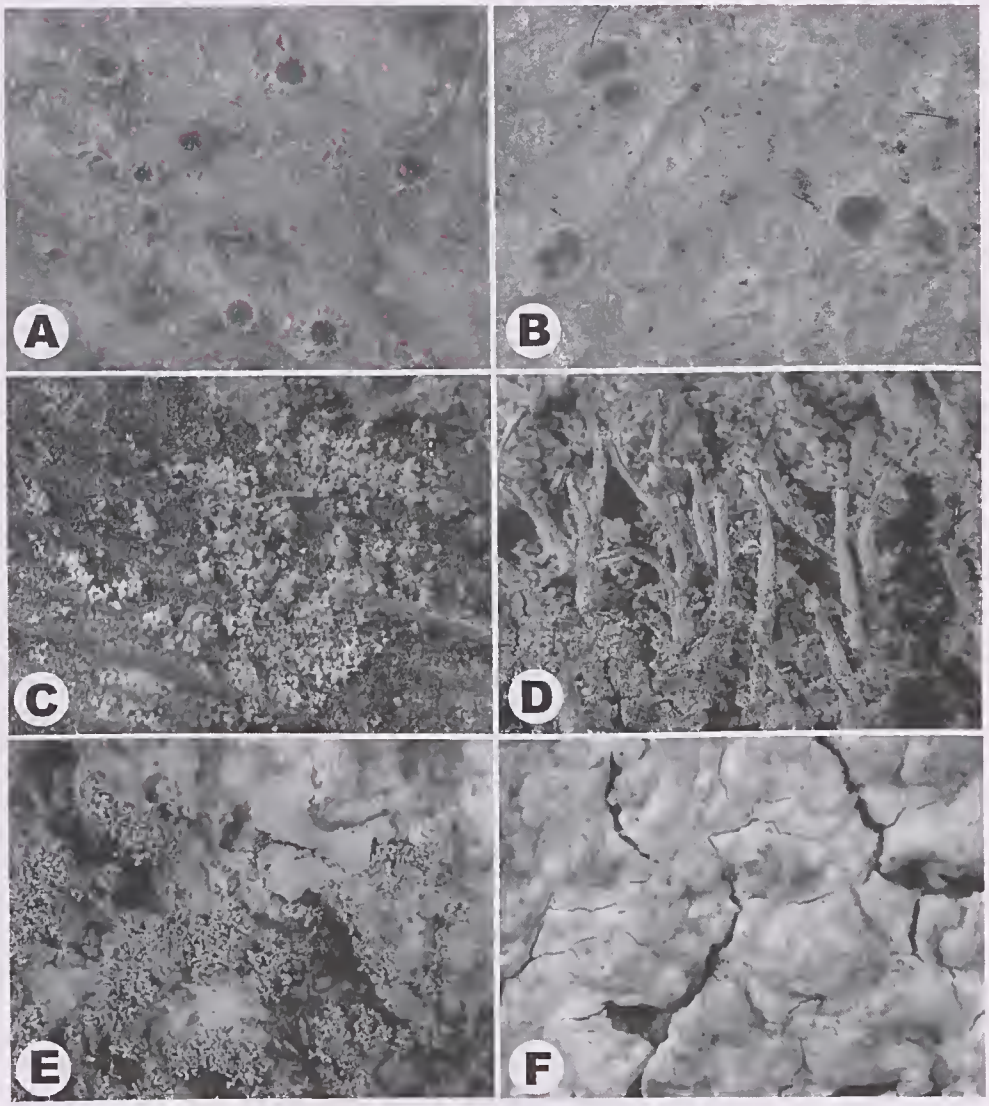

Fig. 2. A, *Byssoloma leucoblepharum*. **B,** *Calenia depressa*. **C,** *Chrysothrix xanthina*. **D,** *Cladonia macilenta*. **E,** *Coccocarpia glaucina*. **F,** *Coccotrema cucurbitula*.

candelaris (L.) J.R.Laundon by containing pinastric acid (rather than calycin) (Kalb 2001).

Specimens examined: Fiji: Taveuni: near Wiwi village, altitude 1m, degraded mangrove, on *Cocos nucifera*, *Lumbsch 19818a* (F, SUVA).

Cladonia macilenta Hoffm., *Deutschl. Fl.* 2: 126 (1796)

Illustration: Fig. 2D.

Distribution: cosmopolitan.

Notes: this cosmopolitan species is characterised by having simple to rarely branched, escypherous, ecorticate podetia, red apothecia and pycnidia, and the presence of the barbatic acid chemosyndrome (Archer 1992).

Specimens examined: Fiji: Viti Levu: Monasavu, Guesthouse close to the dam, altitude 900m, trees at parking lot of guesthouse, on *Cyathea*, *Lumbsch 19830b* (F, SUVA).

Coccocarpia glaucina Kremp., *Nuovo Giorn. Bot. Ital.* 7: 14 (1875)

Illustration: Fig. 2E.

Distribution: Pacific and north-eastern Australia (Arvidsson 1982, 1992).

Notes: this species has canaliculate lobes with mostly marginal, distinctly flattened, microphylline isidia (Arvidsson 1982, 1992).

Specimens examined: Fiji: Taveuni: access road to summit of Devo Peak, altitude 700 m, montane relict forest at roadside, on bark, *Lumbsch 19805c* (F, SUVA); Bouma Falls, altitude 10 m, relict forest, on bark, *Lumbsch 19815k* (F, SUVA).

Coccotrema cucurbitula (Mont.) Müll.Arg., *Nuovo Giorn. Bot. Ital.* 21: 51 (1889)

Illustration: Fig. 2F.

Distribution: Pacific; widely distributed in southern South America, south-east Australia, Tasmania, New Zealand, and other pacific islands (Messuti 1996).

Notes: this species is readily distinguished by the perithecioid ascomata with periphysoids, large, one-celled, hyaline ascospores, and the presence of the norstictic chemosyndrome (Messuti 1996, Messuti & Vobis 2002).

Specimens examined: Fiji: Viti Levu: Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 950 m, *Agathis-Dacrydium* dominated upland forest, on bark, *Lumbsch 19825e*; *19825f* (F, SUVA).

Coenogonium congense Dodge, *Ann. Miss. Bot. Gard.* 40: 350 (1953)

Illustration: Fig. 3A.

Distribution: pantropical (Dodge 1953, Rivas Plata et al. 2006).

Notes: this recently resurrected *Coenogonium* has a shelf-like, compact thallus with narrow algal filaments and 2-celled, biseriate ascospores (Rivas Plata et al. 2006).

Specimens examined: Fiji: Viti Levu: Nadarivatu Nature Reserve, secondary mountain forest at road to Koro'o, altitude 750 m, secondary mountain forest dominated by *Agathis* and *Podocarpus*, on bark, *Lumbsch 19849h'* (F, SUVA).

Coenogonium flavum (Malcolm & Vězda) Malcolm, *Australas. Lichenology* 54: 19 (2004)

Illustration: Fig. 3B.

Distribution: pantropical (Rivas Plata et al. 2006).

Notes: this *Coenogonium* species has a crustose thallus, lacks isidia, and has tubular, straight pycnidia with conidia up to 2 µm broad (Rivas Plata et al. 2006).

Specimens examined: Fiji: Taveuni: near Wiwi village, altitude 1 m, degraded mangrove forest, on mangrove, *Lumbsch 19817c* (F, SUVA).

Coenogonium nepalense (G.Thor & Vězda) Lücking, Aptroot & Sipman, *Fungal Diversity* 23: 297 (2006)

Illustration: Fig. 3C.

Distribution: pantropical (Rivas Plata et al. 2006).

Notes: *Coenogonium nepalense* is readily distinguished among the crustose *Coenogonium* spp. by having short, narrowly ellipsoid ascospores and medium-sized, pale yellow apothecia (Rivas Plata et al. 2006).

Specimens examined: Fiji: Taveuni: near Wiwi village, altitude 1m, degraded mangrove forest, on mangrove, *Lumbsch 19817b* (F, SUVA).

Cyphellostereum pusiolum (Berk. & M.A.Curtis) D.A.Reid, *Beih. Nova Hedwigia* 18: 342 (1965)

Illustration: Fig. 3D.

Distribution: pantropical (Aptroot & Sipman 1991).

Notes: this lichenised basidiomycete occurs on soil and mosses.

Specimens examined: Fiji: Viti Levu: Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 1200 m, cloud forest, on soil, *Lumbsch 19839b* (F, SUVA).

Dibaeis absoluta Kalb & Gierl, in Gierl & Kalb, *Herzogia* 9: 613 (1993)

Illustration: Fig. 3E.

Distribution: pantropical (Gierl & Kalb 1993).

Notes: this species is readily distinguished by the sessile to shortly stalked, pink apothecia, absence of soredia, and the presence of the baeomycesic acid chemosydrome (Gierl & Kalb 1993).

Specimens examined: Fiji: Viti Levu: Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 1200 m, cloud forest, on soil, *Lumbsch 19832b* (F, SUVA).

Dibaeis sorediata Kalb & Gierl, in Gierl & Kalb, *Herzogia* 9: 615 (1993)

Illustration: Fig. 3F.

Distribution: palaeotropical (Gierl & Kalb 1993).

Notes: the combination of shortly stalked to sessile apothecia and the presence of soredia characterise this species. *D. absoluta* is similar but lacks soredia (Gierl & Kalb 1993).

Specimens examined: Fiji: Viti Levu: Nadarivatu Nature Reserve, roadside on road to Koro'o, altitude 900 m, on soil, *Lumbsch 19848b* (F, SUVA).

Dictyonema irpicinum (Mont.) Nyl., *Ann. Sci. Nat.*, Bot., sér. 4, 11: 240 (1859)

Illustration: Fig. 4A.

Distribution: pantropical (Chaves et al. 2004).

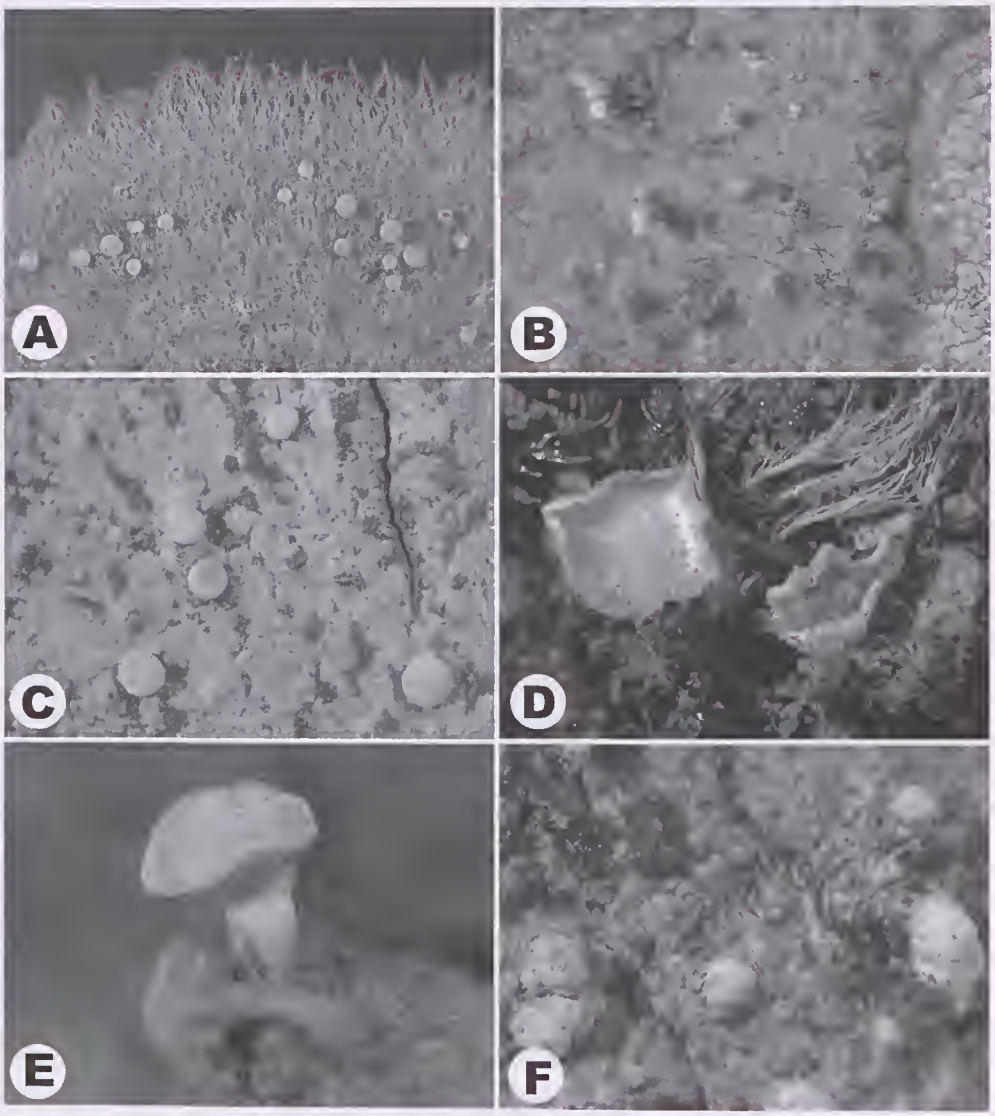

Fig. 3. **A,** *Coenogonium congense.* **B,** *Coenogonium flavum.* **C,** *Coenogonium nepalense.* **D,** *Cyphellostereum pusiolum.* **E,** *Dibaeis absoluta.* **F,** *Dibaeis sorediata.*

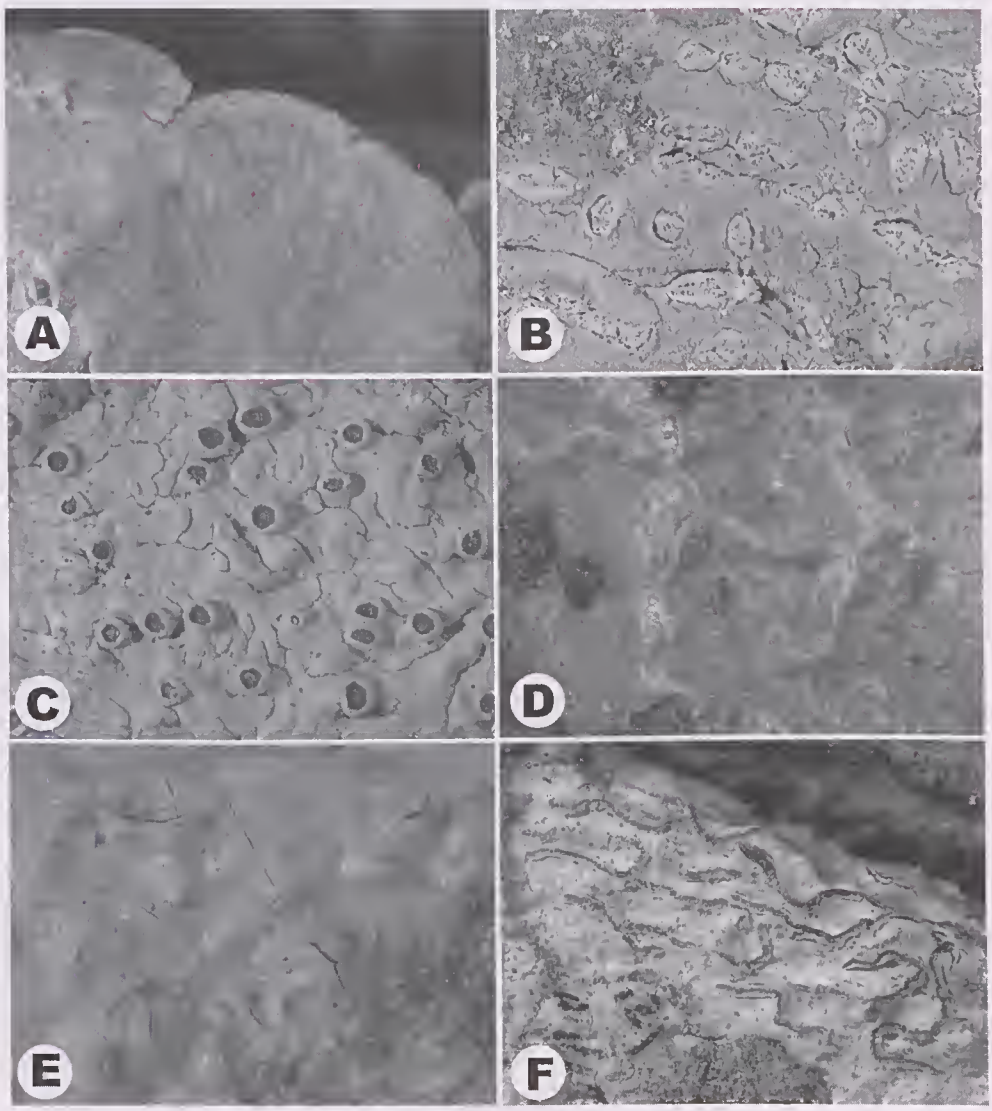

Fig. 4. A, *Dictyonema irpicinum*. **B,** *Diorygma hieroglyphicum*. **C,** *Dirinaria confluens*. **D,** *Fissurina dumastii*. **E,** *Fissurina dumastioides*. **F,** *Graphis caesiella*.

Notes: this species forms semicircular cushions of intricate cyanobacterial filaments surrounded by a fungal hyphal sheath. It resembles *D. sericeum* but differs in the presence of clamps in the free fungal hyphae.

Specimens examined: **Fiji: Viti Levu:** Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 1200 m, cloud forest, on bark, *Lumbsch 19837e* (F, SUVA).

Diorygma hieroglyphicum (Pers.) Staiger & Kalb, in Kalb et al., *Symb. Bot. Upsal.* 34(1): 151 (2004)

Illustration: Fig. 4B.

Distribution: pantropical (Kalb et al. 2004).

Notes: this species is characterised by immersed, branched lirellae with a whitish pruinose disc and split between disc and margin, 1-spored asci with eumuriform ascospores, and the presence of norstictic and stictic acids (Kalb et al. 2004).

Specimens examined: **Fiji:** Taveuni: near Naeangai village, altitude 1m, mangrove forest dominated by *Heritiera litoralis*, on mangrove, *Lumbsch 19821h* (F, SUVA).

Dirinaria confluens (Fr.) D.D. Awasthi, *Bibl. Lichenol.* 2: 281 (1975)

Illustration: Fig. 4C.

Distribution: pantropical (Awasthi 1975, Elix 2009a).

Notes: this is a common, pantropical species, which is readily identified by the broad, adnate, longitudinally folded lobes, black lower surface, the absence of vegetative propagules, and the presence of divaricatic acid (Awasthi 1975).

Specimens examined: **Fiji: Viti Levu:** Nadi area, roadside between Lamawai and Nadi, altitude 2 m, on mangrove, *Lumbsch 19844a* (F, SUVA).

Fissurina dumastii Fée, *Essai Crypt. Exot.* (Paris) 1: 59 (1825)

Illustration: Fig. 4D.

Distribution: pantropical (Staiger 2002).

Notes: this species has a poorly developed exciple, non- to faintly amyloid, 3-septate ascospores and lacks secondary metabolites (Staiger 2002).

Specimens examined: **Fiji: Viti Levu:** Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, *Agathis-Dacrydium* dominated upland forest, on bark, *Lumbsch 19825p* (F, SUVA).

Fissurina dumastioides (Fink) Staiger, *Bibl. Lichenol.* 85: 161 (2002)

Illustration: Fig. 4E.

Distribution: pantropical (Staiger 2002).

Notes: this species differs from *F. dumastii* by containing stictic acid (Wirth & Hale 1978).

Specimens examined: **Fiji:** Taveuni: access road to summit of Devo Peak, altitude 700 m, montane relict forest at roadside, on bark, *Lumbsch 19805g* (F, SUVA).

Graphis caesiella Vain., *Acta Soc. Fauna Fl. Fenn.* 7(2): 122 (1890)

Illustration: Fig. 4F.

Distribution: pantropical (Archer 2009).

Notes: this taxon is characterised by immersed to erumpent lirellae, entire, white pruinose labia, a laterally carbonised exciple, transversely septate ascospores, and the presence of norstictic acid (Lücking et al. 2008a).

Specimens examined: Fiji: Taveuni: Coconut Research Station, altitude 24 m, coconut plantation, on *Cocos nucifera*, *Lumbsch 19809 l-2* (F, SUVA).

Graphis duplicata Ach., *Syn. Meth. Lich.*: 81 (1814)

Illustration: Fig. 5A.

Distribution: pantropical (Lücking et al. 2008a).

Notes: this species lacks secondary metabolites and has a clear hymenium, prominent, striate lirellae lacking a thalline cover and transversely septate ascospores (Lücking et al. 2008a).

Specimens examined: Fiji: Taveuni: access road to summit of Devo Peak, altitude 700 m, montane relict forest at roadside, on bark, *Lumbsch 19804s* (F, SUVA).

Graphis intricata Fée, *Essai Crypt. Exot.*, Suppl. (Paris): 42 (1837)

Illustration: Fig. 5B.

Distribution: pantropical (Archer 2009).

Notes: this species has narrow, richly branched lirellae, a entirely carbonised exciple, small ascospores, and contains the norstictic acid chemosyndrome (Archer 2009).

Specimens examined: Fiji: Viti Levu: Nadi area, roadside between Lamawai and Nadi, altitude 2 m, on mangrove, *Lumbsch 19844b* (F, SUVA).

Graphis lineola Ach., *Lich. Univ.*: 264 (1810)

Illustration: Fig. 5C.

Distribution: pantropical (Archer 2009).

Notes: this species lacks secondary metabolites and is further characterised by having short, simple lirellae, a laterally carbonised exciple and an inspersed hymenium (Archer 2009).

Specimens examined: Fiji: Viti Levu: Nadi area, roadside between Korovuto and Nadi, altitude 2 m mangrove , on mangrove, *Lumbsch 19841e, 19841h* (F, SUVA).

Gyalectidium filicinum Müll.Arg., *Flora*, Jena 64: 101 (1881)

Illustration: Fig. 5D.

Distribution: pantropical (Lücking 2008).

Notes: this taxon is characterised by a verrucose, corticate thallus, yellowish green discs, and laminal to submarginal hyphophores with two lateral projections (Lücking 2008).

Specimens examined: Fiji: Viti Levu: Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 1200 m, cloud forest, on leaves, *Lumbsch 19835e* (F, SUVA).

Gyalectidium imperfectum Vezda, *Nova Hedwigia* 58: 131 (1994)

Illustration: Fig. 5E.

Distribution: pantropical (Lücking 2008).

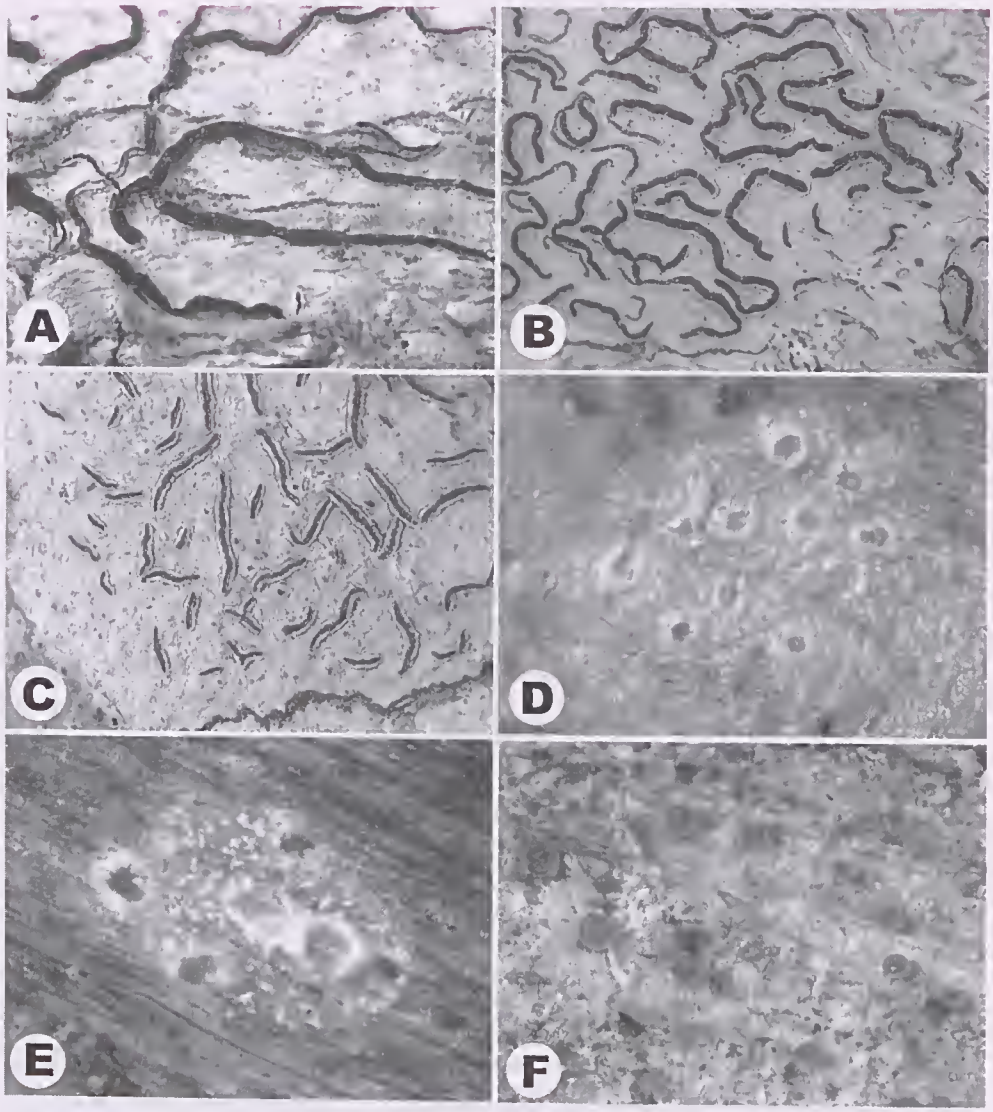

Fig. 5. A,. *Graphis duplicata.* **B,** *Graphis intricata.* **C,** *Graphis lineola.* **D,** *Gyalectidium filicinum.* **E,** *Gyalectidium imperfectum.* **F,** *Gyalideopsis intermedia.*

Notes: this taxon is characterised by a verrucose, corticate thallus, yellowish green discs, and marginal hyphophores forming adnate, lunular, dark spots (Lücking 2008).

Specimens examined: **Fiji: Viti Levu:** Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 1200 m, cloud forest, on leaves, *Lumbsch 19835a* (F, SUVA).

Gyalideopsis intermedia Lücking, *Bibl. Lichenol.* 65: 69 (1997)

Illustration: Fig. 5F.

Distribution: previously known from the Neotropics (Lücking 2008), reported here for the Paleotropics for the first time.

Notes: this species has a verrucose thallus, yellow apothecia, and 1-spored asci with eumuriform ascospores (Lücking 2008).

Specimens examined: **Fiji: Viti Levu:** Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 1200 m, cloud forest, on leaves, *Lumbsch 19835i* (F, SUVA).

Heterodermia incana (Stirt.) D.D.Awasthi, *Geophytology* 3: 114 (1973)

Illustration: Fig. 6A–B.

Distribution: Indo-Pacific (Kurokawa 1962).

Notes: this species lacks cilia on the thallus surface and at the apothecial margins, is esorediate, has a white lower surface, ecorticate, a I+ amyloid excipulum but I– medulla, and contains atranorin and zeorin.

Specimens examined: **Fiji: Taveuni:** access road to summit of Devo Peak, altitude 700 m, montane relict forest at roadside, on bark, *Lumbsch 19804w* (F, SUVA).

Hypotrachyna imbricatula (Zahlbr.) Hale, *Smithson. Contr. Bot.* 25: 41 (1975)

Distribution: pantropical (Elix 1994a, Hale 1975).

Notes: this species is characterised by the cylindrical isidia, densely dichotomously branched rhizines, and the presence of barbatic acid (Elix 1994a).

Specimens examined: **Fiji: Viti Levu:** Monasavu, Guesthouse close to the dam, altitude 900 m, on lemon tree at parking lot of guesthouse, *Lumbsch 19831d* (MAF, SUVA), 19831e (MAF, SUVA); Nadarivatu Nature Reserve, secondary mountain forest at road to Koro'o, *Lumbsch 19853b* (MAF, SUVA).

Lecanora helva Stizenb., *Ber. Thätigk. St Gall. Naturwiss. Ges.*: 218 (1890)

Illustration: Fig. 6C.

Distribution: pantropical (Guderley 1999, Lumbsch 1994).

Notes: this species belongs to a group of closely related tropical species with small, orange-brown apothecia, a granulose epihymenium, large crystals in the amphithecium, and small ascospores. This group also includes *L. achroa* Nyl. and *L. leprosa* Fée. *Lecanora helva* is mainly distinguished from these species in containing the 2'-*O*-methylperlatolic acid chemosyndrome (Lumbsch & Elix 1993).

Specimens examined: **Fiji: Taveuni:** Coconut Research Station, altitude 24m, coconut plantation, on *Cocos nucifera*, *Lumbsch 19809d*, *19809n* (F, SUVA); near Wiwi village, altitude 1 m, degraded mangrove, on mangrove, *Lumbsch 19817a* (F, SUVA); near Naeangai village, altitude 1 m, mangrove-like coastal forest dominated by *Heritiera litoralis*, on fallen tree, *Lumbsch 19824b*

(F, SUVA). **Viti Levu:** Nadi area, mangrove at roadside between Samisoni and Nadi, altitude 2 m, on mangrove, *Lumbsch 19843d*, *19843o*, *19844m* (F, SUVA); Nadi area, close to Navisabasaba village, on road to Naduga from Nadi, altitude 2 m, on mangrove, *Lumbsch 19845k* (F, SUVA).

Lecanora leproplaca Zahlbr., in Magnusson & Zahlbruckner, *Ark. Bot.* 31A(6): 64 (1944)

Illustration: Fig. 6D.

Distribution: pantropical (Lumbsch 2004).

Notes: this species is similar to *L. tropica*, but differs in having a sorediate thallus (Lumbsch 1994).

Specimens examined: Fiji: Taveuni: Bouma Falls, altitude 10 m, relict forest, on bark, *Lumbsch 19815r* (F, SUVA). **Viti Levu:** Nadi area, mangrove at roadside between Samisoni and Nadi, altitude 2 m, on mangrove, *Lumbsch 19843c*, *19843m* (F, SUVA); Nadi area, mangrove at roadside between Lamawai and Nadi, altitude 2 m, on mangrove, *Lumbsch 19844h* (F, SUVA).

Lecanora leprosa Fée, *Essai Crypt. Exot.* (Paris) 1: 118 (1825)

Illustration: Fig. 6E.

Distribution: pantropical (Lumbsch 2004).

Notes: this species is similar to *L. helva*, but can be distinguished by the presence of gangaleoidin and related substances (Lumbsch & Elix 1993).

Specimens examined: Fiji: Viti Levu: Nadi area, roadside between Korovuto and Nadi, altitude 2 m, on mangrove, *Lumbsch 19841b* (F, SUVA).

Lecanora subimmersa (Fée) Vain., *Etud. Lich. Bres.* 1: 98 (1890)

Illustration: Fig. 6F.

Distribution: pantropical (Lumbsch et al. 1994).

Notes: this *Lecanora* species is readily distinguished by having small, immersed apothecia (Lumbsch et al. 1994).

Specimens examined: Fiji: Taveuni: near Naeangai village, altitude 1 m, mangrove-like coastal forest dominated by *Heritiera litoralis*, on siliceous rocks, *Lumbsch 19820* (F, SUVA).

Lecanora tropica Zahlbr., *Cat. Lich. Univers.* 5: 589 (1928)

Illustration: Fig. 7A.

Distribution: pantropical (Lumbsch 1994).

Notes: this common, tropical species has red-brown apothecial discs, an egranulose epihymenium, large crystals in the amphithecium, and contains the chodatin chemosyndrome (Lumbsch 2004).

Specimens examined: Fiji: Viti Levu: Nadi area, roadside between Samisoni and Nadi, altitude 2 m, on mangrove, *Lumbsch 19843b*, *19843j* (F, SUVA).

Lepraria lobificans Nyl., *Flora* 56: 196 (1873)

Illustration: Fig. 7B.

Distribution: cosmopolitan (Elix 2009b).

Notes: this common, cosmopolitan species has a whitish-grey, slightly lobate thallus and contains atranorin and the stictic acid chemosyndrome (Elix 2009b).

Specimens examined: Viti Levu: Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, cloud forest, altitude 1200 m, on siliceous rocks, *Lumbsch 19840 a, b* (F, SUVA).

Leucodecton albidulum (Nyl.) Mangold, in Mangold et al., *Fl. Australia* 57: 654 (2009)

Illustration: Fig. 7C.

Distribution: Australasian, previously known from eastern Australia and New Caledonia (Mangold et al. 2009).

Notes: it is characterised by a thick, ecorticate thallus, narrow, brown, transversely septate ascospores, and the presence of stictic acid (Mangold et al. 2009).

Specimens examined: Fiji: Viti Levu: Nadarivatu Nature Reserve, secondary mountain forest at road to Koro'o, altitude 750 m, secondary mountain forest dominated by *Agathis* and *Podocarpus*, on bark, *Lumbsch 19849w* (F, SUVA).

Leucodecton occultum (Eschw.) Frisch, *Bibl. Lichenol.* 92: 157 (2006)

Illustration: Fig. 7D.

Distribution: pantropical (Mangold et al. 2009).

Notes: this species can be identified by the presence of an ecorticate thallus, more or less immersed, lepadinoid ascomata with a double margin, small, brown ascospores, and the presence of the norstictic acid chemosyndrome (Mangold et al. 2009).

Specimens examined: Fiji: Viti Levu: Nadi area, roadside between Korovuto and Nadi, altitude 2 m, mangrove , on *Ficus*, *Lumbsch 19842a* (F, SUVA).

Leucodecton phaeosporum (Nyl.) Rivas Plata & Lücking, *Lichenologist* 42: 167 (2010)

Illustration: Fig. 7E.

Distribution: pantropical (Mangold et al. 2009).

Notes: this species has a thick, bulging thallus and columnar crystal clusters similar to *Leptotrema wightii* (Taylor) Müll. Arg, which differs in having larger ascomata, in lacking stictic acid, and in containing small red anthroquinone crystals (Mangold et al. 2009). The two species are phylogenetically unrelated (Rivas Plata 2011).

Specimens examined: Fiji: Viti Levu: Nadarivatu Nature Reserve, road to Koro'o, altitude 750 m, secondary mountain forest dominated by *Agathis* and *Podocarpus*, on bark, *Lumbsch 19854c* (F, SUVA).

Megalospora sulphurata Meyen, in Meyen & Flotow, *Nova Acta Acad. Caes. Leop.-Carol. Nat. Cur.* 19(suppl.): 228 (1843)

Illustration: Fig. 7F.

Distribution: pantropical (Sipman 1983).

Notes: *Megalospora sulphurata* is distinguished in having large 2-celled ascospores and an orange-brown epihymenium (Sipman 1983). The current circumscription of the species is very broad and probably includes distinct lineages (Untari 2006). One distinctive morphotype which occurs in Fiji has been treated elsewhere and represents a new species, *Megalospora austropacifica* (Lumbsch et al. 2011).

Specimens examined: Fiji: Taveuni:, access road to summit of Devo Peak, altitude 850 m, relict cloud forest, on bark, *Lumbsch 19801c* (F, SUVA). Viti Levu: Nadarivatu Nature Reserve, road to Koro'o, altitude 900 m, roadside tree, on bark, *Lumbsch 19847c* (F, SUVA); Nadarivatu Nature

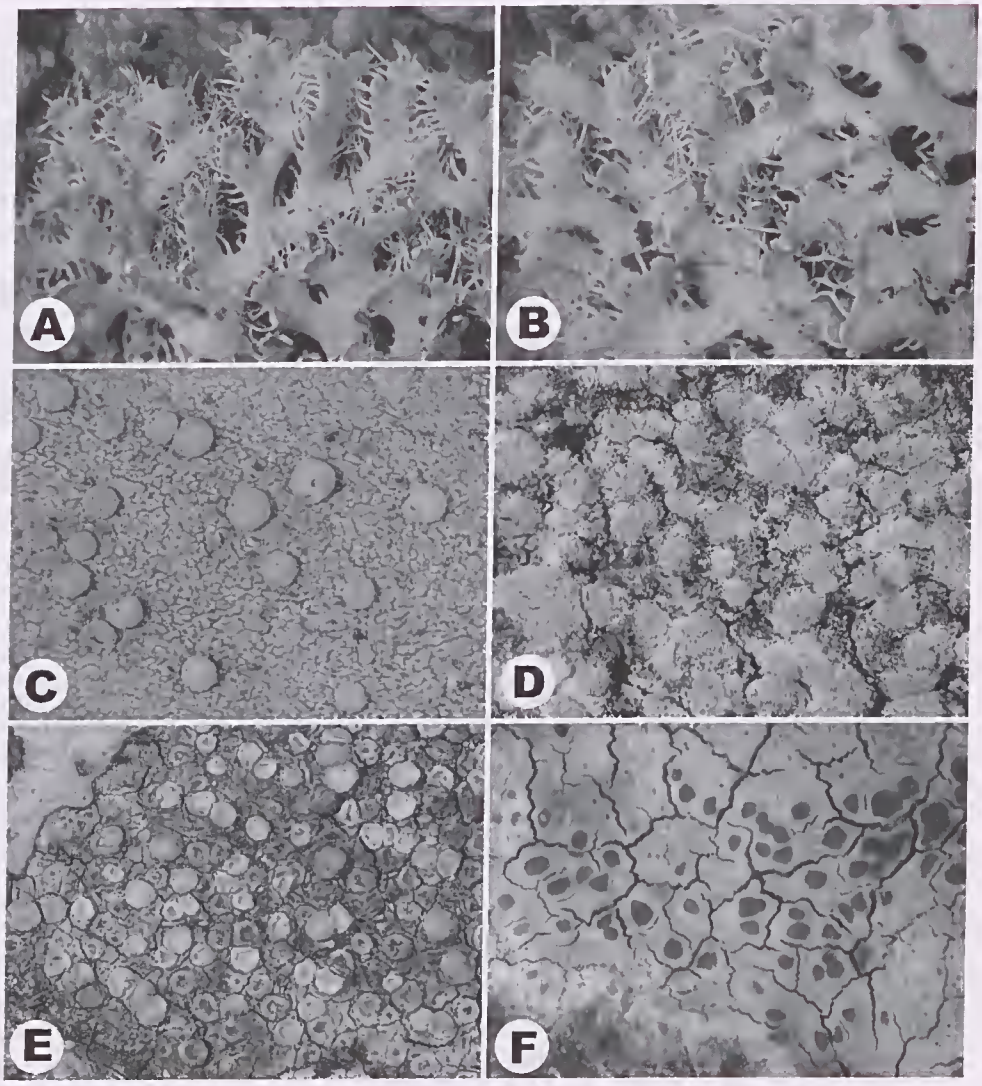

Fig. 6. A, B, *Heterodermia incana.* **C,** *Lecanora helva.* **D,** *Lecanora leproplaca.* **E,** *Lecanora leprosa.* **F,** *Lecanora subimmersa.*

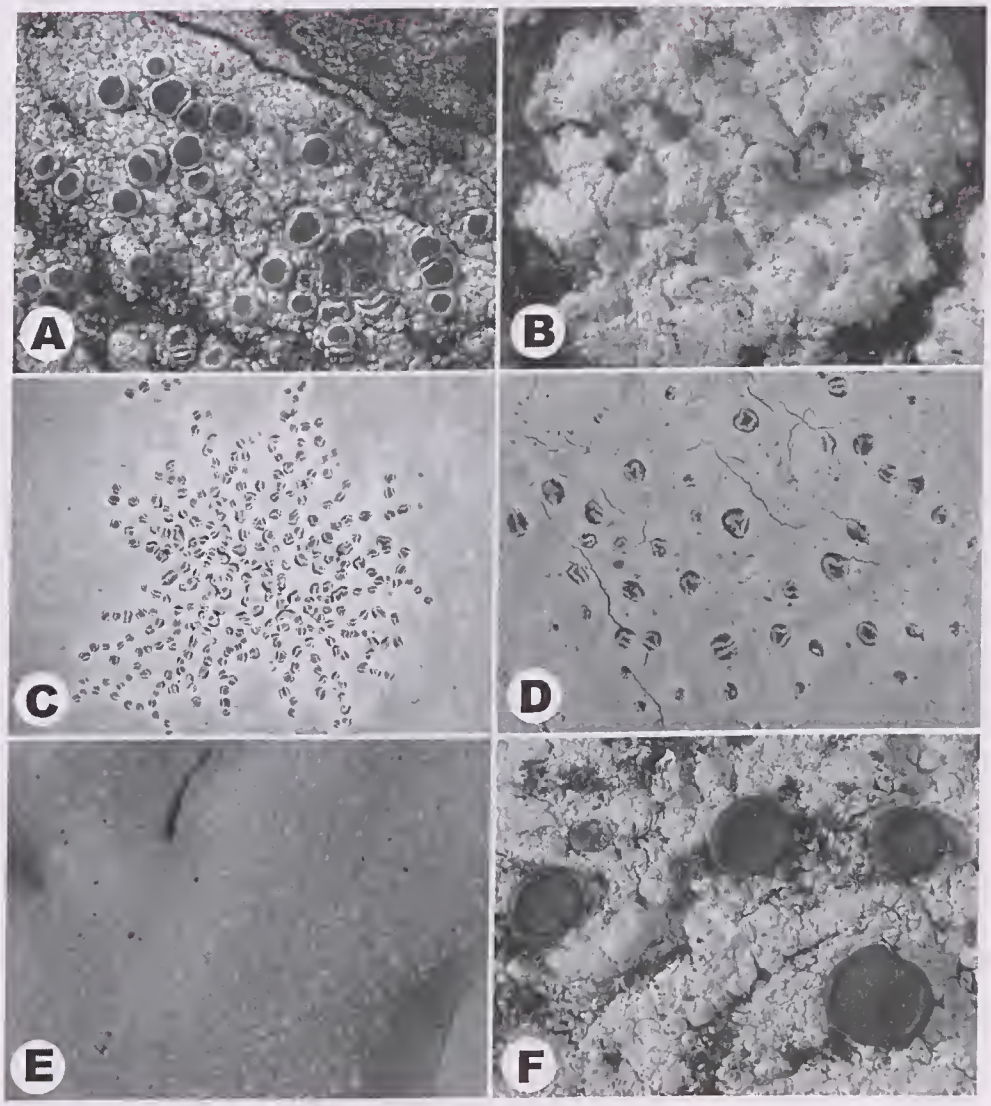

Fig. 7. **A,** *Lecanora tropica.* **B,** *Lepraria lobificans.* **C,** *Leucodecton albidulum.* **D,** *Leucodecton occultum.* **E,** *Leucodecton phaeosporum.* **F,** *Megalospora sulphurata.*

Reserve, road to Koro'o, altitude 750 m, secondary mountain forest dominated by *Agathis* and *Podocarpus*, on bark, *Lumbsch 19850e* (F, SUVA).

Melanotopelia rugosa (Kantvilas & Vězda) Mangold & Lumbsch, *Lichenologist* 40: 44 (2008)

Illustration: Fig. 8A.

Distribution: previously known from southern Argentina, Australia, southern Chile, Falkland Islands, and Auckland and Campbell Islands (Lumbsch et al. 2010, Mangold et al. 2009).

Notes: this taxon is characterised by urceolate, dark ascomata, a carbonised proper exciple, hyaline, muriform ascospores, and the presence of stictic acid (Lumbsch et al. 2010, Mangold et al. 2009, Mangold et al. 2008).

Specimens examined: **Fiji: Viti Levu:** Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 1200 m, cloud forest, on mosses over bark, *Lumbsch 19838a* (F, SUVA).

Pannaria tavaresii P.M.Jørg., *Oper. Bbot.* 45: 68 (1978)

Illustration: Fig. 8B–D.

Distribution: pantropical, extending into mild, temperate areas (Jørgensen & Galloway 1992).

Notes: this species is characterised by its coralloid, digitiform isidia (Jørgensen & Galloway 1992).

Specimens examined: **Fiji: Taveuni:** Access road to summit of Devo Peak, altitude 850 m, Relict cloud forest, over mosses on twigs, *Lumbsch 19803c* (F, SUVA).

Parmotrema abessinicum (Nyl. ex Kremp.) Hale, *Phytologia* 28: 334 (1974)

Distribution: pantropical (Divakar & Upreti 2005).

Notes: the species is distinguished by ciliate lobe margins, perforate apothecia, simple rhizines in the thallus centre and in containing atranorin, norlobaridone, loxodin and protolichesterinic acid (Divakar & Upreti 2005).

Specimens examined: **Fiji: Taveuni:**, access road to summit of Devo Peak, altitude 700 m, montane relict forest at roadside, on bark, *Lumbsch 19805a* (F, SUVA).

Parmotrema hababianum (Gyeln.) Hale, *Phytologia* 28: 336 (1974)

Distribution: pantropical (Divakar & Upreti 2005).

Notes: this taxon is characterised by short marginal cilia, sorediate margins, a lower surface with a white or mottled marginal zone, simple rhizines in the thallus centre and in containing atranorin, norlobaridone and protolichesterinic acid (Divakar & Upreti 2005).

Specimens examined: **Fiji: Viti Levu:** Nadi area, roadside between Lamawai and Nadi, altitude 2 m, on mangrove, *Lumbsch 19844e* (F, SUVA).

Peltigera sumatrana Gyeln., *Rev. Bryol. Licl.* 5: 72 (1932)

Illustration: Fig. 8E.

Distribution: south-east Asia (Serusiaux et al. 2009).

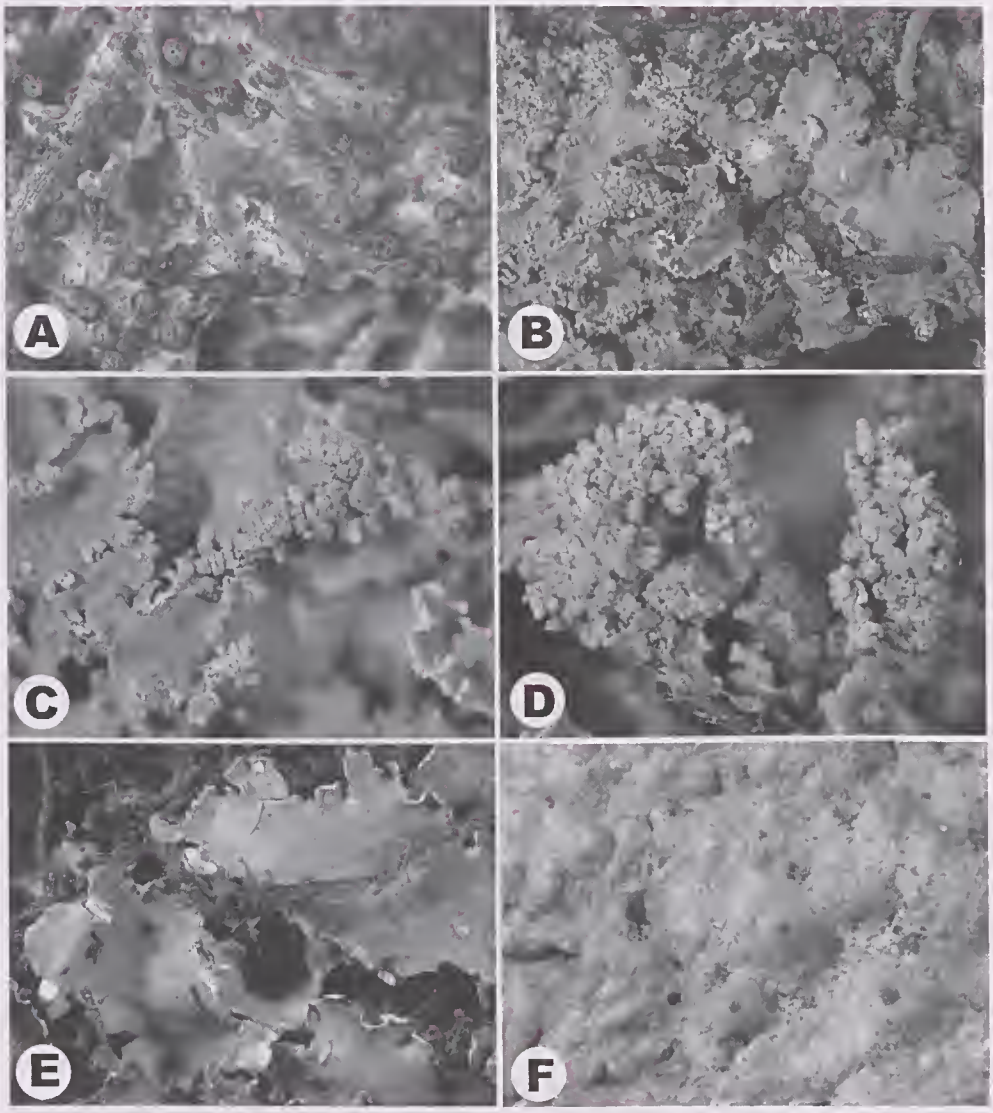

Fig. 8. A, *Melanotopelia rugosa.* B–D, *Pannaria tavaresii.* E, *Peltigera sumatrana.* F, *Porina brisbanensis.*

Notes: this species is characterised by relatively large thalli, a smooth upper surface, and a jet black lower surface with elliptical and whitish interstices, the absence of veins, and densely branched rhizines.

Specimens examined: **Fiji:** Taveuni:, access road to summit of Devo Peak, open vegetation at summit, on soil, *Lumbsch 19807 & T. Pócs* (F, SUVA). **Fiji:** Viti Levu: Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 1200 m, cloud forest, on tree base, *Lumbsch 19833a*, on mosses over bark, *Lumbsch 19838c* (F, SUVA).

Porina brisbanensis Müll.Arg., *Nuovo Giorn. Bot. Ital.* 23: 402 (1891)

Illustration: Fig. 8F.

Distribution: pantropical.

Notes: this species is usually considered a synonym of *Porina internigrans* (Nyl.) Müll. Arg. because of the similar size and septation of the ascospores. However, it differs in the indistinct prothallus and the often conspicuously cracked thallus and particularly in the fine cracks radiating from the ostiolar area.

Specimens examined: **Fiji:** Viti Levu:Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 950 m, *Agathis-Dacrydium* dominated upland forest, on fallen tree, *Lumbsch 19826h* (F, SUVA).

Pyrenula kurzii Ajay Singh & Upreti, *Geophytology* 17: 81 (1987)

Illustration: Fig. 9A.

Distribution: palaeotropical.

Notes: this species is characterised by exposed, jet-black perithecia, an inspersed hymenium, and the mid-sized ascospores (c. 40 × 15 µm) with the end cells somewhat pointed and not separated from the terminal wall by endospore.

Specimens examined: **Fiji:** Taveuni:, access road to summit of Devo Peak, altitude 1190 m, open vegetation at summit, on bark, *Lumbsch 19800c* (F, SUVA).

Pyxine australiensis Kalb, *Herzogia* 10: 61 (1994)

Illustration: Fig. 9B.

Distribution: previously known from Australia and South America (Elix 2009a).

Notes: this taxon is characterised by the absence of isidia or soredia, a yellow medulla, apothecia with a white, internal stipe, and the presence of lichexanthone (Elix 2009a, Kalb 1994).

Specimens examined: **Fiji:** Viti Levu: Nadi area, roadside between Lamawai and Nadi, altitude 2 m, on mangrove, *Lumbsch 19844d* (F, SUVA).

Pyxine consocians Vain., *Philipp. J. Sci., C, Bot.* 8: 109 (1913)

Illustration: Fig. 9C.

Distribution: Indo-Pacific (Rogers 1986).

Notes: this taxon has polysidiangia that may become sorediate, contains atranorin in the cortex and the norstictic acid chemosyndrome in the white medulla (Kalb 1994, Rogers 1986).

Specimens examined: **Fiji:** Viti Levu: Nadi area, close to Navisabasaba village, on road to Naduga from Nadi, altitude 2 m, on mangrove, *Lumbsch 19845a, 19845b* (F, SUVA).

Pyxine copelandii Vain., *Philipp. J. Sci.*, C, Bot. 8: 110 (1913)

Illustration: Fig. 9D.

Distribution: previously known from tropical south-eastern Asia, Australia and New Guinea (Elix 2009a).

Notes: *Pyxine copelandii* has a white medulla, laminal, orbicular soralia, a colourless stipe and contains the norstictic acid chemosyndrome (Elix 2009a).

Specimens examined: **Fiji: Taveuni:** Bouma Falls, altitude 10 m, relict forest, on bark, *Lumbsch 19815g* (F, SUVA).

Pyxine farinosa Kashiw., *Bull. Natl. Sci. Mus.*, Tokyo, B 3: 67 (1977)

Illustration: Fig. 9E.

Distribution: Indo-Pacific (Elix 2009a, Kashiwadani 1977).

Notes: this species is characterised by a yellow to yellow-orange medulla, laminal, orbicular soralia, a colourless stipe, and the presence of atranorin and triterpenes (Elix 2009a, Kashiwadani 1977).

Specimens examined: **Fiji: Taveuni:** Coconut Research Station, altitude 24 m, coconut plantation, on *Cocos nucifera*, *Lumbsch 19809e, j, o* (F, SUVA).

Ramalina celastri (Spreng.) Krog & Swinscow, *Norw. J. Bot.* 23: 159 (1976)

Illustration: Fig. 9F.

Distribution: pansubtropical (Stevens 1987).

Notes: this widely distributed *Ramalina* species is readily distinguished by the solid medulla, esorediate, flat thalli with numerous marginal and laminal apothecia, and the absence of medullary substances (Stevens 1987).

Specimens examined: **Fiji: Taveuni:** near Wiwi village, altitude 1 m, degraded mangrove thicket, on mangrove, *Lumbsch 19817o* (F, SUVA).

Relicina abstrusa (Vain.) Hale, *Phytologia* 28: 484 (1974)

Distribution: pantropical (Elix 1994b).

Notes: this species is distinguished by the dark lower surface of the thallus, cylindrical isidia, and the presence of the norstictic acid chemosyndrome (Elix 1994b).

Specimens examined: **Fiji: Viti Levu:** Nadarivatu Nature Reserve, secondary mountain forest at road to Koro'o, altitude 750 m, secondary mountain forest dominated by *Agathis* and *Podocarpus*, on bark, *Lumbsch 19854f* (F, SUVA).

Strigula maculata (Cooke & Massee) R.Sant., *Symb. bot. upsal.* 12(1): 186 (1952)

Illustration: Fig. 10A.

Distribution: pantropical (Lücking 2008).

Notes: this species is recognised by the dark green thallus which features a thin black marginal line. The dark grees colour of the thallus causes the leaves to appear dark-spotted from a distance, hence the epithet.

Specimens examined: **Fiji: Viti Levu:** Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 1200 m, cloud forest, on leaves, *Lumbsch 19835g* (F, SUVA).

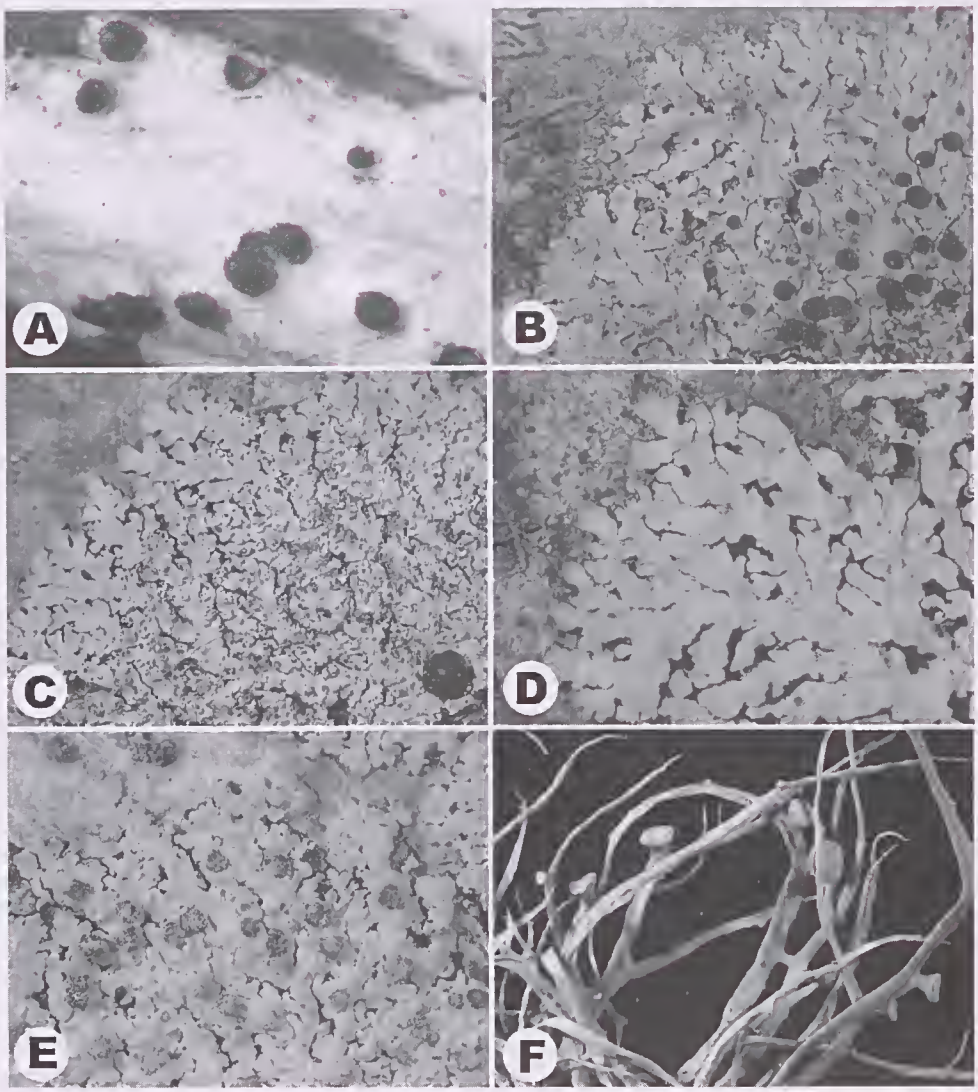

Fig. 9. A, *Pyrenula kurzii.* **B,** *Pyxine australiensis.* **C,** *Pyxine consocians.* **D,** *Pyxine copelandii.* **E,** *Pyxine farinosa.* **F,** *Ramalina celastri.*

Strigula subtilissima (Fée) Müll.Arg., *Flora* 66: 346 (1883)

Illustration: Fig. 10B.

Distribution: pantropical (Lücking 2008).

Notes: this species is recognised by the olive-brown, finely lobate thallus which features a thin black marginal line. It is similar to the preceding species but differs in having more distinct lobes and the olive rather than dark green colour.

Specimens examined: Fiji: Viti Levu: Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 1200 m, cloud forest, on leaves, *Lumbsch 19835b* (F, SUVA).

Thalloloma janeirense Staiger, *Bibl. Lichenol.* 85: 440 (2002)

Illustration: Fig. 10C.

Distribution: previously known from South America (Staiger 2002).

Notes: this species is characterised by having brown apothecial discs, 4–8-spored asci, and short (up to 30 µm long), muriform ascospores (Staiger 2002).

Specimens examined: Fiji: Taveuni: Bouma Falls, altitude 10 m, relict forest, on bark, *Lumbsch 19815u* (F, SUVA).

Thelotrema circumscriptum C.Knight, *Trans. New Zealand Inst.* 15: 349 (1883)

Illustration: Fig. 10D, E.

Distribution: hitherto known from cool-temperate to subtropical rainforests in southern Argentina, Lord Howe Island, Auckland Islands, and New Zealand (Lumbsch et al. 2010).

Notes: this species has lepadinoid ascomata, transversely septate, hyaline, non-amyloid ascospores, and contains salazinic acid (Lumbsch et al. 2010).

Specimens examined: Fiji: Viti Levu: Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access Road, altitude 950 m, *Agathis-Dacrydium* dominated upland forest, on bark, *Lumbsch 19825a* (F, SUVA).

Thelotrema defossum (Müll.Arg.) Mangold, *Aust. Syst. Bot.* 21: 221 (2008)

Illustration: Fig. 10F.

Distribution: previously recorded from Australia, Lord Howe Island and Timor (Mangold et al. 2009).

Notes: *Thelotrema defossum* is characterised by immersed apothecia and small, faintly amyloid, halonate ascospores with thin walls, and the absence of secondary metabolites (Lumbsch et al. 2008).

Specimens examined: Fiji: Viti Levu: Nadarivatu Nature Reserve, road to Koro'o, altitude 750 m, secondary mountain forest dominated by *Agathis* and *Podocarpus*, on bark, *Lumbsch 19849y* (F, SUVA).

Thelotrema diplotrema Nyl., *Annls Sci. Nat.*, Bot., sér. 4, 11: 258 (1859)

Illustration: Fig. 11A.

Distribution: palaeotropical (Mangold et al. 2009).

Notes: this species has immersed to slightly emergent apothecia, large, transversely septate, thick-walled, amyloid ascospores, and lacks secondary metabolites (Mangold et al. 2009).

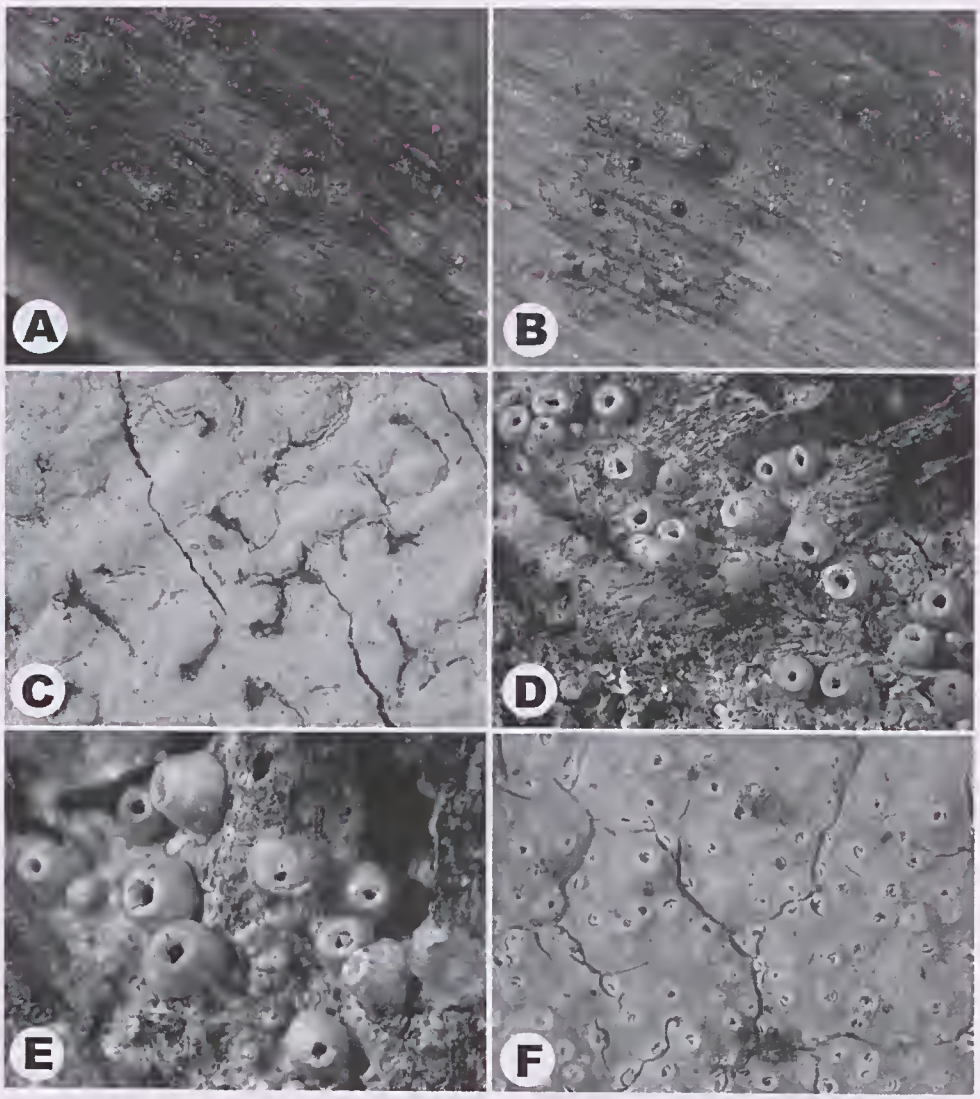

Fig. 10. A, *Strigula maculata.* **B,** *Strigula subtilissima.* **C,** *Thalloloma janeirense.* **D, E,** *Thelotrema circumscriptum.* **F,** *Thelotrema defossum.*

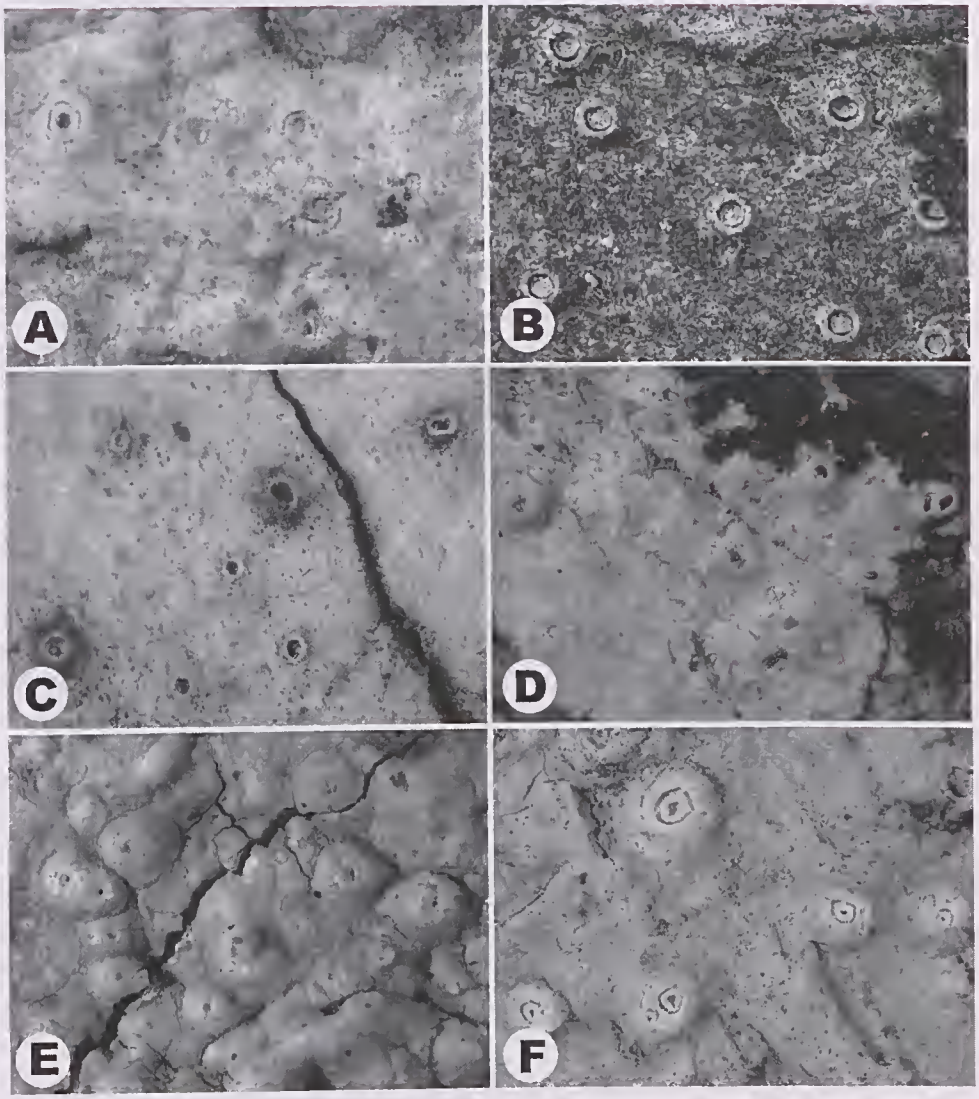

Fig. 11. A, *Thelotrema diplotrema*. B, *Thelotrema lacteum*. C, *Thelotrema lepadodes*. D, *Thelotrema pachysporum*. E, *Thelotrema porinaceum*. F, *Thelotrema porinoides*.

Specimens examined: Fiji: Taveuni:, access road to summit of Devo Peak, altitude 850 m, relict cloud forest, on bark, *Lumbsch 19801b* (F, SUVA).

Thelotrema lacteum Kremp., in Nylander, *Flora*, Jena 47: 269 (1864)

Illustration: Fig. 11B.

Distribution: pantropical (Mangold et al. 2009).

Notes: this species somewhat resembles a *Chapsa* in ascoma morphology because of the widely exposed disc, but has an entire thalline margin; it features brown, transversely septate ascospores and lacks secondary metabolites (Mangold et al. 2009).

Specimens examined: **Fiji: Viti Levu:** Nadi area, roadside between Samisoni and Nadi, altitude 2 m, on mangrove, *Lumbsch 19843a* (F, SUVA).

Thelotrema lepadodes Tuck., *Proc. Amer. Acad. Arts Sci.* 5: 405 (1862)

Illustration: Fig. 11C.

Distribution: pantropical (Mangold et al. 2009).

Notes: *Thelotrema lepadodes* is morphologically similar to the common and widespread *T. lepadinum* (Ach.) Ach., but is readily distinguished by having a non-corticate, more or less whitish thallus and brownish, non- to faintly amyloid ascospores.

Specimens examined: **Fiji:** Taveuni: Bouma Falls, altitude 10 m, relict forest, on bark, *Lumbsch 19815m* (F, SUVA).

Thelotrema pachysporum Nyl., *Bull. Soc.Llinn. Normandie* 2: 72 (1868)

Illustration: Fig. 11D.

Distribution: pantropical (Mangold et al. 2009).

Notes: as the name of this species suggests, it has large, thick-walled ascospores. These are transversely septate, brown and weakly amyloid. The asci are 4–8-spored asci and the taxon lacks secondary metabolites (Mangold et al. 2009). In other respects this species is morphologically similar to the preceding one.

Specimens examined: **Fiji:** Taveuni:, access road to summit of Devo Peak, altitude 700 m, montane relict forest at roadside, on bark, *Lumbsch 19804a* (F, SUVA).

Thelotrema porinaceum Müll.Arg., *Nuovo Giorn. Bot. Ital.* 23: 130 (1891)

Illustration: Fig. 11E.

Distribution: palaeotropical (Mangold et al. 2009).

Notes: this taxon is characterised by a thick thallus, immersed fruiting bodies, large, muriform ascospores, and the presence of the norstictic acid chemosyndrome (Mangold et al. 2007). Norstictic acid is rare among *Thelotrema* species. Species containing norstictic acid include *T. eungellaense* Mangold, Elix & Lumbsch, *T. subweberi* Sipman, and *T. weberi* Hale. The two latter species are readily distinguished by their sessile, urceolate ascomata, while *T. eungellaense* has 4-spored asci and smaller ascospores.

Specimens examined: **Fiji: Viti Levu:** Nadarivatu Nature Reserve, road to Koro'o, altitude 750 m, secondary mountain forest dominated by *Agathis* and *Podocarpus*, on bark, *Lumbsch 19849f* (F, SUVA).

Thelotrema porinoides (Mont. & Bosh), *Enum. Plant. Ins. Java Sumatra*: 484 (1855)

Illustration: Fig. 11F.

Distribution: pantropical (Mangold et al. 2009). This species is the most common thelotremoid Graphidaceae in Fiji.

Notes: the species is readily distinguished by the emergent apothecia with a free proper exciple, transversely septate, hyaline, thick-walled, and strongly amloid ascospores, and the presence of stictic acid (Mangold et al. 2009).

Specimens examined: Fiji: Taveuni:: access road to summit of Devo Peak, altitude 1190 m, open vegetation at summit, on bark, *Lumbsch 19800b* (F, SUVA); altitude 850 m, relict cloud forest, on twigs, *Lumbsch 19802b* (F, SUVA); altitude 700 m, montane relict forest at roadside, on bark, *Lumbsch 19804l, 19804n, q, 19805d* (F, SUVA). Viti Levu: Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 1200 m, cloud forest, on bark, *Lumbsch 19834* (F, SUVA); Nadarivatu Nature Reserve, road to Koro'o, altitude 750 m, secondary mountain forest dominated by *Agathis* and *Podocarpus*, on twigs, *Lumbsch 19851* (F, SUVA); Monasavu, road to the Nabilabila intake, off the Monasavu-Wainisavulevu Fiji Electricity Authority access road, altitude 950 m, *Agathis-Dacrydium* dominated upland forest, on bark, *Lumbsch 19825n, 19826g* (F, SUVA); altitude 1100 m, cloud forest, on bark, *Lumbsch 19829c* (F, SUVA); Nadi area, roadside between Samisoni and Nadi, altitude 2 m, on mangrove, *Lumbsch 19843k* (F, SUVA); Nadarivatu Nature Reserve, Telecom Towers, altitude 970 m, isolated trees at logged summit, on bark, *Lumbsch 19846b* (F, SUVA); altitude 750 m, secondary mountain forest dominated by *Agathis* and *Podocarpus*, on bark, *Lumbsch 19850d, 19854e* (F, SUVA).

Acknowledgments

This study was supported by the National Geographic Committee for Research and Exploration, Grant No. 8247-07. HTL, MVK and AN wish to thank Allan Fife (CHR), Tamas Pòcs (Felsőtárkány), Elizabeth Brown (NSW), John E. Braggins (Auckland), Matt Renner (NSW), Marika Tuiwawa and Jone Navuso (both SUVA), for their company and help during a joint expedition to Fiji. Kevin Havener (Chicago) is thanked for help with the formatting of the text.

References

Aptroot A. & Sipman H. (1991) New lichens and lichen records from New Guinea. *Willdenowia* 20: 221–256.

Archer A.W. (1992) Cladoniaceae. *Flora of Australia* 54: 107–152.

Archer A.W. (2004) Additions to the lichen flora of Fiji and Vanuatu based on Graphidaceae in the F.R.M. Wilson collection at the National Herbarium of New South Wales. *Telopea* 10: 771–776.

Archer A.W. (2009) Graphidaceae. *Flora of Australia* 57: 84–194.

Arvidsson L. (1982) A monograph of the lichen genus *Coccocarpia*. *Opera Botanica* 67: 1–96.

Arvidsson L. (1992) Coccocarpiaceae. *Flora of Australia* 54: 153–159.

Awasthi D.D. (1975) A monograph of the lichen genus *Dirinaria*. *Bibliotheca Lichenologica* 2: 1–108.

Chaves J.L., Lucking R., Sipman H.J.M., Umaña L. & Navarro E. (2004) A first assessment of the ticolichen biodiversity inventory in Costa Rica: The genus *Dictyonema* (Polyporales : Atheliaceae). *Bryologist* 107: 242–249.

Divakar P.K. & Upreti D.K. (2005) *Parmelioid lichen in India (A revisionary study)*. Bishen Singh Mahendra Pal Singh, Dehra Dun, India.

Dodge C.W. (1953) Some lichens from tropical Africa. *Annals of the Missouri Botanical Garden* 40: 271–401.

Egea J.M. & Torrente P. (1995) *Melampilidium metabolum* belongs in *Bactrospora*. *Mycotaxon* 53: 57–61.

Elix J.A. (1994a) *Hypotrachyna*. *Flora of Australia* 55: 49–59.

Elix J.A. (1994b) *Relicina*. *Flora of Australia* 55: 168–182.

Elix J.A. & McCarthy P.M. (1998) Catalogue of the lichens of the smaller Pacific islands. *Bibliotheca Lichenologica* 70: 1–361.

Elix J.A. (2001) Additional lichen records from Oceania 7. Parmeliaceae from Fiji. *Australasian Lichenology* 48: 34–37.

Elix J.A. & McCarthy P.M. (2008) Checklist of Pacific Island Lichens. http://www.anbg.gov.au/abrs/lichenlist/PACIFIC_introduction.html.

Elix J.A. (2009a) Physciaceae. *Flora of Australia* 57: 494–533.

Elix J.A. (2009b) Stereocaulaceae. *Flora of Australia* 57: 60–73.

Galloway D.J. (1980) Notes on the lichen genus *Baeomyces* in New Zealand. *Botaniska Notiser* 133: 77–83.

Galloway D.J. (2007) *Flora of New Zealand Lichens. Revised Second Edition Including Lichen-Forming and Lichenicolous Fungi. Volumes 1 and 2*. Manaaki Whenua Press, Lincoln, New Zealand.

Gierl C. & Kalb K. (1993) Die Flechtengattung *Dibaeis*. Eine Übersicht über die rosafrüchtigen Arten von *Baeomyces* sens. lat. nebst Anmerkungen zu *Phyllobaeis* gen. nov. *Herzogia* 9: 593–645.

Guderley R. (1999) Die *Lecanora subfusca*-Gruppe in Süd- und Mittelamerika. *Journal of the Hattori Botanical Laboratory* 87: 131–257.

Hafellner J. (1997) A world monograph of *Brigantiaea* (lichenized Ascomycotina, Lecanorales). *Symbolae Botanicae Upsalienses* 32 (1): 35–74.

Hale M.E. (1975) A revision of lichen genus *Hypotrachyna* (Parmeliaceae) in tropical America. *Smithsonian Contributions to Botany* 25: 1–73.

Harada H. (2001) Taxonomic notes on pyrenocarpous lichens in Japan (4). *Anisomeridium ubianum* (Vain.) R.C. Harris (Monoblastiaceae). *Hikobia* 13: 411–414.

Harris R.C. (1995) *More Florida Lichens. Including the 10c Tour of the Pyrenolichens*. Publ. by the Author, Bronx, N.Y.

Heads M. (2006) Seed plants of Fiji: an ecological analysis. *Biological Journal of the Linnean Society* 89: 407–431.

Johnston J. (2001) Baeomycetaceae. *Flora of Australia* 58A: 14–16.

Jorgensen P.M. & Galloway D.J. (1992) Pannariaceae. *Flora of Australia* 54: 246–293.

Kalb K. (1994) *Pyxine* species from Australia. *Herzogia* 10: 61–69.

Kalb K. (2001) New or otherwise interesting lichens. I. *Bibliotheca Lichenologica* 78: 141–167.

Kalb K. (2004) *Pyxine* species from Australia. *Herzogia* 10: 61–69.

Kalb K., Staiger B. & Elix J.A. (2004) A monograph of the lichen genus *Diorygma* - a first attempt. *Symbolae Botanicae Upsalienses* 34(1): 133–181.

Kashiwadani H. (1977) The genus *Pyxine* (lichens) in Papua New Guinea. *Bulletin of the National Science Museum [Tokyo]* 3B: 63–70.

Keppel G. (2005) Botanical studies within the PABITRA wet-zone transect, Fiji: Viti Levu: Fiji. *Pacific Science* 59: 165–174.

Krempelhuber A. von (1873) Beitrag zur Kenntniss der Lichenen-Flora der Südsee-Inseln. *Journal des Museum Godeffroy, Geographische, ethnographische und naturwissenschaftliche Mittheilungen* 1: 93–110.

Kurokawa S. (1962) A monograph of the genus *Anaptychia*. *Beihefte zur Nova Hedwigia* 6: 1–115.

Lücking R. (2008) Foliicolous lichenized fungi. *Flora Neotropica* 103: 1–867.

Lücking R., Chaves J.L., Sipman H.J.M., Umaña L. & Aptroot A. (2008a) A first assessment of the Ticolichen Biodiversity Inventory in Costa Rica: the genus *Graphis*, with notes in the genus *Hemithecium* (Ascomycota: Ostropales: Graphidaceae). *Fieldiana (Botany)* 46: 1–131.

Lücking R. (2008b) *Foliicolous lichenized fungi*. Published for the Organization for Flora Neotropica by The New York Botanical Garden Press.

Lücking R., Lumbsch H.T. & von Konrat M. (2010) *Graphis collinsiae* (Ascomycota: Graphidaceae), a new lichen species from the Fiji Islands. *Bryologist* 113: 356–359.

Lumbsch H.T. & Elix J.A. (1993) Notes on the circumscription of the lichens *Lecanora leprosa* and *L. sulphurescens* (Lecanoraceae, lichenised Ascomycotina). *Tropical Bryology* 7: 71–75.

Lumbsch H.T. (1994) Die *Lecanora subfusca*-Gruppe in Australasien. *Journal of the Hattori Botanical Laboratory* 77: 1–175.

Lumbsch H.T., Feige G.B. & Elix J.A. (1994) Chemical variation in two species of the *Lecanora subfusca* group (Lecanoraceae, lichenized Ascomycotina). *Plant Systematics and Evolution* 191: 227–236.

Lumbsch H.T. (2004) Lecanoraceae. In: *Flora of Australia. Volume 56A, Lichens 4* (McCarthy P.M. and Mallett K. eds): 11–12. ABRS/CSIRO Australia, Melbourne.

Lumbsch H.T., Mangold A., Martin M.P. & Elix J.A. (2008) Species recognition and phylogeny of *Thelotrema* species in Australia (Ostropales, Ascomycota). *Australian Systematic Botany* 21: 217–227.

Lumbsch H.T., Papong K. & Naikatini A. (2009) A new terricolous species of *Gyalidea* (Gomphillaceae, Ascomycota) from Fiji. *Nova Hedwigia* 88: 111–116.

Lumbsch H.T., Divakar P.K., Messuti M.I., Mangold A. & Lücking R. (2010) A survey of thelotremoid lichens (Ascomycota: Ostropales) in subantarctic regions excluding Tasmania. *Lichenologist* 42: 203–224.

Lumbsch H.T., Ahti T., Altermann S., Amo G., Aptroot A., Arup U., Barcenas Peña A., Bawingan P.A., Benatti M.N., Betancourt L., Björk C.R., Boonpragob K., Brand M., Bungartz F., Caceres M., Candan M., Chaves J.L., Clerc P., Common R., Coppins B.J., Crespo A., Dal Forno M., Divakar P.K., Duya M.V., Elix J.A., Elvebakk A., Fankhauser J., Farkas E., Ferraro L.I., Fischer E., Galloway D.J., Gaya E., Giralt M., Goward T., Grube M., Hafellner J., Hernández J., Herrera-Campos M.A., Kalb K., Kärnefelt I., Kantvilas G., Killmann D., Kirika P., Knudsen K., Komposch H., Kondratyuk S., Lawrey J.D., Mangold A., Marcelli M.P., Mccune B., Michlig A., Miranda Gonzalez R., Moncada B., Naikatini A., Nelsen M.P., Øvstedal D.O., Palice Z., Papong K., Parnmen S., Pérez-Ortega S., Printzen C., Rico V.J., Rivas Plata E., Robayo J., Rosabal D., Ruprecht U., Salazar Allen N., Sancho L., Santos De Jesus L., Santos Vieira T., Schultz M., Seaward M.R.D., Sérusiaux E., Schmitt I., Sipman H.J.M., Sohrabi M., Søchting U., Sogaard M.Z., Sparrius L., Spielmann A.A., Spribille T., Sutjaritturakan J., Thammathaworn A., Thell A., Thor G., Thüs H., Timdal E., Truong C., Türk R., Umaña Tenorio L., Upreti D.K., Van Den Boom P., Vivas Rebuelta M., Wedin M., Will-Wolf S., Wirth V., Wirtz N., Yahr R., Yeshitela K., Ziemmeck F. & Lücking R. (2011) One hundred new species of lichenized fungi: a signature of undiscovered global diversity. *Phytotaxa* 18: 1–127.

Mangold A., Elix J.A. & Lumbsch H.T. (2007) The norstictic acid containing *Thelotrema* species in Australia. *Bibliotheca Lichenologica* 95: 459–470.

Mangold A., Martin M.P., Kalb K., Lucking R. & Lumbsch H.T. (2008) Molecular data show that *Topeliopsis* (Ascomycota, Thelotremataceae) is polyphyletic. *Lichenologist* 40: 39–46.

Mangold A., Elix J.A. & Lumbsch H.T. (2009) Thelotremataceae. *Flora of Australia* 57: 195–420.

Marbach B. (2000) *Corticole und lignicole Arten der Flechtengattung Buellia sensu lato in den Subtropen und Tropen*. Bibliotheca Lichenologica, 74, J. Cramer, Berlin, Stuttgart.

McCarthy P.M. & Elix J.A. (2000) Additional lichen records from Oceania 4. Some pyrenolichens in Fiji. *Australasian Lichenology* 46: 40–42.

Messuti M.I. (1996) Notes on the lichen genus *Coccotrema* in southern South America. *New Zealand Journal of Botany* 34: 57–64.

Messuti M.I. & Vobis G. (2002) *Flora Criptogámica de Tierra del Fuego. Vol. 13, Fasc. 13. Lichenes Pertusariales: Coccotremataceae, Megasporaceae, Pertusariaceae*. Consejo Nacional de Investigaciones Cientificas y Técnicas, Buenos Aires.

Molho D.M., Bodo B., Culberson W.L. & Culberson C.F. (1981) A chemically distinctive new *Ramalina* from Fiji. *Bryologist* 84: 396–398.

Rivas Plata E. (2011) Historical biogeography, ecology and systematics of the family Graphidaceae (Lichenized Ascomycota: Ostropales). Ph. D. Thesis, University of Illinois at Chicago, Chicago.

Rivas Plata E., Lücking R., Aptroot A., Sipman H.J.M., Umana L., Chaves J.L. & Lizano D. (2006) A first assessment of the Ticolichen biodiversity inventory in Costa Rica: the genus *Coenogonium* (Ostropales: Coenogoniaceae). *Fungal Diversity* 23: 255–321.

Rogers R.W. (1986) The genus *Pyxine* (Physiaceae, lichenized Ascomycetes) in Australia. *Australian Journal of Botany* 34: 131–154.

Santesson R. (1952) Foliicolous Lichens I. A revision of the taxonomy of the obligately foliicolous, lichenized fungi. *Symbolae Botanicae Upsalienses* 12: 1–590.

Serusiaux E., Goffinet B., Miadlikowska J. & Vitikainen O. (2009) Taxonomy, phylogeny and biogeography of the lichen genus *Peltigera* in Papua New Guinea. *Fungal Diversity* 38: 185–224.

Sipman H.J.M. (1983) A monograph of the lichen family Megalosporaceae. *Bibliotheca Lichenologica* 18: 1–241.

Staiger B. (2002) Die Flechtenfamilie Graphidaceae. Studien in Richtung einer natürlicheren Gliederung. *Bibliotheca Lichenologica* 85: 1–526.

Stevens G.N. (1987) The lichen genus *Ramalina* in Australia. *Bulletin of the British Museum (Natural History), Botany Series* 16: 107–223.

Streimann H. (1986) Catalogue of the Lichens of Papua New Guinea and Irian Jaya. *Bibliotheca Lichenologica* 22: 1–145.

Untari L.F. (2006) The lichen genus *Megalospora* in Java. *Mycotaxon* 97: 129–143.

von Konrat M, Naikatini A, Tuiwawa M, Söderström L, Fife A, Renner M, Brownsey P, Perrie L, Hagborg A, Pócs T, Lumbsch HT, Braggins J, Séneca A & Brown E (2011) A brief history of the cryptogams of Fiji and prospects for the future. *Telopea* 13: 361–374.

Wirth M. & Hale M.E. Jr (1978) Morden-Smithsonian Expedition to Dominica: the lichens (Graphidaceae). *Smithsonian Contributions to Botany* 40: 1–64.

Zahlbruckner A. (1896) Lichenes Mooreani. *Annalen des Kaiserlich-Königlichen naturhistorischen Hofmuseums zu Wien* 11: 188–196.

Manuscript received 29 May 2010 and accepted 29 May 2011.

Telopea 13(3) 405–454

Checklist of hornworts and liverworts of Fiji

Lars Söderström[1], Anders Hagborg[2], Tamás Pócs[3], Andrea Sass-Gyarmati[3], Elizabeth Brown[4], Matt von Konrat[2] and Matt Renner[4]

[1]*Department of Biology, Norwegian University of Science and Technology, N-7491 Trondheim, Norway*
[2]*Botany Department, The Field Museum, Chicago, Illinois 60605-2496, U.S.A.*
[3]*Botany Department, Eszterházy College, Eger. Pf. 43, H-3301, Hungary*
[4]*National Herbarium of New South Wales, Royal Botanic Gardens Sydney, Mrs Macquaries Rd, Sydney NSW 2000, Australia*

Abstract

The first checklist of liverworts and hornworts is provided for the Republic of Fiji. Geographic coverage includes the islands Viti Levu, Vanua Levu, Taveuni, Kadavu, and Ovalau and surrounding smaller islands. There remain many localities in Fiji, including entire islands, which have never or scarcely been collected for this group of plants. We report 11 hornwort taxa and 280 liverwort taxa. An additional 34 taxa previously reported from Fiji are either rejected or noted as doubtful records. The list is based on a compilation of over 250 literature references, including monographs, broader regional studies and molecular investigations. Despite its apparent diversity, the liverwort and hornwort flora of Fiji has received negligible attention, and few publications exist that have focused solely on this group of islands. Knowledge of the liverwort and hornwort flora, of Fiji and regionally for the islands of the South Pacific, remains too poor to reliably comment about range-restricted or endemic species. New records will undoubtedly be reported, of regionally widespread species as well as species likely new to science. A number of the taxa presented here may be synonyms of other taxa as they are poorly known taxonomically. The combination, *Frullania parhamii* (R.M.Schust.) R.M.Schust. ex von Konrat, L.Söderstr. et A.Hagborg, is made replacing a previously invalid combination.

Introduction

Conservation International identified all the islands of Micronesia and Polynesia, including the islands of Fiji, as the Polynesia-Micronesia hotspot, one of thirty-five biodiversity hotspots in the world (Mittermeier et al. 2005). Alarmingly, Conservation International recognised this hotspot as having one of the highest extinction rates in the world. In Fiji, many localities, including entire islands, currently have never or scarcely been collected for many plant groups (DoE 1997). von Konrat et al. (2011, this issue) provide an overview of the current state of floristic knowledge for Fijian liverworts and hornworts, as well as for lichenised fungi, mosses, ferns and lycophytes for the island group. Historically, very few publications have focused solely on collections from Fiji.

© 2011 Royal Botanic Gardens and Domain Trust ISSN0312-9764

Prodromus florae hepaticarum polynesiae (Miller et al. 1983) remains a significant work that included Fiji, yet was largely an uncritical compilation of names and literature. We here present the first ever checklist of liverworts and hornworts for the islands of Fiji in an effort to further promote bryological research in the region, and provide a foundation for revisionary studies and floristic research. The checklist presented here provides the critical distinction between those names recorded in the literature as first hand reports where authors have cited specimens and those names that are apparently not based on cited specimens. This checklist fills a major gap in our knowledge of Fijian terrestrial plants. The significance of checklists is summarised by Söderström et al. (2007, 2008), including outlining the utility of checklists as powerful and important tools, and their applicability to taxonomy, systematics, and conservation. Undoubtedly, many new records will be reported for the Fijian islands. This is supported by the fact that at least 75 other liverwort and hornwort species occur on the nearby islands of Samoa alone as well as the report of Pócs et al. (2011, this issue) of 48 new taxa for the islands. In this checklist we report 291 taxa in 286 species as occurring on the Fijian islands. An additional 27 taxa are rejected from the flora of the islands and 7 are reported as doubtful records.

Methodology and materials

In this checklist the taxa are arranged in alphabetic order. The list is in three parts, i) accepted reports, ii) doubtful, iii) excluded reports. Finally, for ease of reference, a list of all synonyms applied in the checklist or names of alternative use is given.

Each accepted taxon is qualified using a four level ranking system that indicates our level of confidence about a taxon's value. The coding convention is outlined in detail by von Konrat et al. (2010a) and the following provides a brief explanation:

? Problem with the taxon name and value. The taxon is invalid, illegitimate or 'orphaned' in a synonymised genus or species but its correct placement is unknown.

* Serious doubts. There are doubts about the value of the taxon. It can be that there are conflicting views without any substantial evidence in any direction, conflicting views with substantiating evidence supporting one or both positions, or there is evidence pointing towards synonymization but it is premature to do it.

** Knowledge problem. The taxon is not well known by the person evaluating it. It may be a newly described species or a species originally not well described and not restudied recently.

*** Accepted. A good taxon as currently understood based on personal experience or on a convincing taxonomic revision. Nomenclature and/or taxonomic position may, however, be questioned, e.g. elements may be excluded from the taxon, but the taxon with the current type will still be accepted.

Additional notes are provided throughout explaining the scoring for individual taxa, especially for taxa that that are denoted *.

This checklist provides a critical distinction between names recorded in the literature as first hand reports, i.e. "A report citing a specimen or an observation of material either in the field 'and then locality fairly exact' or among collected specimens" (bold font) and second hand reports, i.e. "Merely citing a locality that is not exact enough to

be searched for the species, and not apparently based on a specimen that can be found" (regular font) (see von Konrat et al. 2010a). This will greatly aid further evaluation of these names for Fiji. Moreover, the list includes all types of Fijian origin.

In order to condense the list we use the words "both as" or "all as" to denote that the author used this name(s) in both/all publications by the same author. The word "also" indicates that the author(s) used the current accepted name in addition to another name.

Island abbreviations are as follows: Viti Levu (VI), Vanua Levu (VA), Taveuni (TA), Kadavu (KA), Ovalau (OV, including nearby smaller islands) and Lau group (LA). We make an attempt to order the reports by these provinces. The abbreviation FIJ is used for reports that are not specific enough to be allocated to an island.

Nomenclatural novelty

Frullania parhamii (R.M.Schust.) R.M.Schust. ex von Konrat, L.Söderstr. et A.Hagborg, **comb. nov.**

Basionym: *Neohattoria parhamii* R.M.Schust. J. Hatt. Bot. Lab. 26: 243, 1963. Type: Summit of Mt Delaikoro (Ndelaikoro), south of Lambasa, Vanua Levu, Fiji, on bark in open rain forest, *R. M. Schuster 56709*, June 1962 (holotype, F).

Synonym: *Frullania parhamii* (R.M.Schust.) R.M.Schust. Hepat. Anthocerotae N. Amer. 5: 34, 1992, *nom. inval.* (Art. 33.4; basionym not cited; McNeill et al. 2006).

Checklist of taxa accepted from Fiji

Current list includes all taxa that we accept as occurring in Fiji. However, the taxonomic value of some of them is questionable.

Anthocerotophyta

Dendroceros

*** *D. cavernosus* J.Haseg. FIJ: Hasegawa 1986b, 2002. VI: **Hasegawa 1986a.**

* [1]*D. crispatus* (Hook.) Nees VI: **Campbell 1971**, Miller et al. 1983.

*** *D. granulatus* Mitt. VI: **Hasegawa 1986a.**

*** *D. javanicus* (Nees) Nees FIJ: Hasegawa 1986b. VI: **Gibbs 1909**, Hürlimann 1960 as *Dendroceros pusillus*, Miller et al. 1983 also as *Dendroceros pusillus*, **Hasegawa 1986a.**

Folioceros

*** *F. amboinensis* (Schiffn.) Piippo FIJ: Hasegawa 1993 as *Anthoceros amboinensis*, Piippo 1993. VI: **Hasegawa 1986a** as *Folioceros spinisporus.*

[1] *Dendroceros crispatus* is treated as a synonym of *Dendroceros crispus* (Sw.) Nees by Gradstein & Costa (2003) but accepted as a species by J.C.Villarreal (pers. comm.).

*** *F. fuciformis* (Mont.) D.C.Bharadwaj VI: **Campbell 1971** as *Anthoceros fuciformis*, Miller et al. 1983 as *Anthoceros fuciformis*.

*** *F. glandulosus* (Lehm. et Lindenb.) D.C.Bharadwaj FIJ: Schiffner 1898 as *Anthoceros glandulosus*, Schiffner 1955 as *Aspiromitus glandulosus*, Hasegawa 2002 as *Anthoceros appendiculatus*. VI: **Schiffner 1890** as *Anthoceros glandulosus*, Miller et al. 1983 as *Anthoceros glandulosus*.

*** *F. pinnilobus* (Steph.) D.C.Bharadwaj VI: **Hasegawa 1986a**.

Hattorioceros

** *H. striatisporus* (J.Haseg.) J.Haseg. VI: **Hasegawa 2000**.

Megaceros

*** *M. flagellaris* (Mitt.) Steph. FIJ: Stephani 1916, Miller et al. 1983 as *Anthoceros flagellaris*. VI: **Gibbs 1909** as *Anthoceros flagellaris*, **Hürlimann 1960** as *Megaceros monospirus*, Miller et al. 1983 also as *Megaceros monospirus* Steph., **Hasegawa 1986a**.

Phaeoceros

*** *P. carolinianus* (Michx.) Prosk. FIJ: Hasegawa 1984 as *Phaeoceros laevis* subsp. *carolinianus*, Schuster 1992b as *Anthoceros laevis* subsp. *carolinianus*, Piippo 1993 as *Phaeoceros laevis* subsp. *carolinianus*, Guo & Zhang 1999 as *Phaeoceros laevis* subsp. *carolinianus*, Damsholt 2002 as *Phaeoceros laevis* subsp. *carolinianus*. VI: **Campbell 1971** as *Phaeoceros laevis* subsp. *carolinianus*, Miller et al. 1983 as *Phaeoceros laevis* subsp. *carolinianus*.

Marchantiophyta

Acrolejeunea

*** *A. pycnoclada* (Taylor) Schiffn. FIJ: Mizutani 1978a, Bapna & Kachroo 2000b. VA: **Campbell 1971** as *Ptychocoleus pycnocladus*, Miller et al. 1983. VI: Miller et al. 1983.

*** — subsp. *pycnoclada* (Taylor) Schiffn. KA: **Pócs et al. 2011**. VI: Gradstein 1975, **Hürlimann 1989**.

Aneura

*** *A. maxima* (Schiffn.) Steph. VA: **Campbell 1971** as *Riccardia maxima*, Miller et al. 1983 as *Riccardia maxima*. VI: **Gibbs 1909**, Miller et al. 1983 as *Riccardia maxima*.

Archilejeunea

* [2] *A. bilabiata* (Mitt.) Steph. FIJ: **TYPE** of *Phragmicoma bilabiata*, **Mitten 1873** as *Phragmicoma bilabiata*, Stephani 1911, Bonner 1962b, **Thiers 1983** as *Phragmicoma bilabiata*, Miller et al. 1983 also as *Phragmicoma bilabiata*, **Geissler & Bischler 1989** as *Phragmicoma bilabiata*.

[2] *Archilejeunea bilabiata* is a doubtful species (type unknown) (Geissler & Gradstein 1994).

** *A. brachyantha* J.B.Jack et Steph. FIJ: Stephani 1911, Verdoorn 1934. OV: **TYPE, Jack & Stephani 1894, Bonner 1962b, Campbell 1971**, Miller et al. 1983. VA: **Campbell 1971**, Miller et al. 1983. VI: **Campbell 1971**, Miller et al. 1983.

*** *A. planiuscula* (Mitt.) Steph. KA: **Pócs et al. 2011**. TA: **Pócs et al. 2011**. VA: **Campbell 1971** as *Archilejeunea mariana*, Miller et al. 1983 as *Spruceanthus marianus*. VI: **Campbell 1971** as *Archilejeunea mariana*, Miller et al. 1983 as *Spruceanthus marianus*.

Bazzania

** *B. caudistipula* (Steph.) Inoue et H.A.Mill. FIJ: Bonner 1977. VI: **TYPE** of *Mastigobryum caudistipulum*, **Stephani 1908b** as *Mastigobryum caudistipulum*, Inoue & Miller 1965, Miller et al. 1983 also as *Mastigobryum caudistipulum*, **Meagher 2010**.

** *B. combinata* (J.B.Jack et Steph.) Steph. VI: **Gibbs 1909** as *Mastigobryum combinatum*, Miller et al. 1983.

*** *B. erosa* (Reinw., Blume et Nees) Trevis. VI: **Campbell 1971**, Miller et al. 1983.

** *B. falcifolia* (Steph.) H.A.Mill. TA: **Pócs et al. 2011**.

** *B. hamatifolia* (Steph.) H.A.Mill. FIJ: **TYPE** of *Mastigobryum hamatifolium*, Miller et al. 1983 also as *Mastigobryum hamatifolium*.

** *B. insignis* (De Not.) Trevis. VI: **Hürlimann 1985**.

** *B. manillana* (Gottsche ex Steph.) S.Hatt. TA: **Pócs et al. 2011**.

** *B. paradoxa* (Sande Lac.) Steph. FIJ: Stephani 1897, Evans 1932, Kitagawa 1967, Piippo et al. 2002. VI: **Jack & Stephani 1894** as *Mastigobryum paradoxum*, Miller et al. 1983 also as *Mastigobryum paradoxum*.

** *B. subacuta* (Mitt.) Steph. VI: **Hürlimann 1985**.

*** *B. tridens* (Reinw., Blume et Nees) Trevis. FIJ: **Stephani 1908a** as *Mastigobryum australe*, Jovet-Ast 1951 as *Bazzania australe*, Kitagawa 1978 as *Bazzania australis*, Geissler & Bischler 1985 as *Mastigobryum australe*, Hürlimann 1985 as *Bazzania australis*. OV: **TYPE** of *Herpetium australe*, **Montagne 1843** as *Herpetium australe*, **Bonner 1965** as *Herpetium australe*, **Campbell 1971**, Miller et al. 1983. TA: **Campbell 1971**, Miller et al. 1983. VA: **Campbell 1971**, Miller et al. 1983, Miller et al. 1983 as *Bazzania australis*, *Mastigobryum australe* and *Herpetium australe*. VI: **Campbell 1971, Kitagawa 1973a** as *Bazzania australis*, Miller et al. 1983, **Hürlimann 1985**.

*** *B. uncigera* (Reinw., Blume et Nees) Trevis. FIJ: Stephani 1908b as *Mastigobryum uncigerum*, Kitagawa 1967, 1978, Hattori 1975c, Bapna & Kachroo 2000. OV: **Jack & Stephani 1894** as *Mastigobryum uncigerum*, Miller et al. 1983.

** *B. vitiana* Mitt. ex Steph. FIJ: **TYPE, TYPE** of *Mastigobryum vitiense*, **Stephani 1908a** as *Mastigobryum vitiense*, **Bonner 1963a**, Miller et al. 1983 as *Mastigobryum vitiense*. OV: **Campbell 1971** as *Bazzania vitiensis*, Miller et al. 1983. VA: **Campbell 1971** as *Bazzania vitiensis*, Miller et al. 1983. VI: **Campbell 1971** as *Bazzania vitiensis*.

*** *B. vittata* (Gottsche) Trevis. VI: **Campbell 1971**, Miller et al. 1983, **Hürlimann 1985**.

Caudalejeunea

*** *C. reniloba* (Gottsche) Steph. FIJ: Miller et al. 1983 as *Lopholejeunea contractilis* and *Phragmicoma contractilis*, Bapna & Kachroo 2000b, Gradstein et al. 2002. OV: **Jack & Stephani 1894** as *Caudalejeunea recurvistipula*, **Campbell 1971**, Miller et al. 1983. TA: **Pócs et al. 2011.** VA: **Campbell 1971**, Miller et al. 1983. VI: **Campbell 1971**, Miller et al. 1983, **Mizutani 1988**, **Hürlimann 1989**, **Thiers & Gradstein 1989**.

Ceratolejeunea

*** *C. belangeriana* (Gottsche) Steph. FIJ: Hürlimann 1995. KA: **Pócs et al. 2011.** OV: **Campbell 1971**, Miller et al. 1983. VI: **Campbell 1971**, Miller et al. 1983.

*** *C. vitiensis* Steph. FIJ: **TYPE**, Stephani 1913, **Bonner 1963b.** VI: Miller et al. 1983 [Viti Levu with a "?"].

Cheilolejeunea

** *C. ceylanica* (Gottsche) R.M.Schust. et Kachroo KA: **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Campbell 1971** as *Pycnolejeunea ceylanica*, Miller et al. 1983, **Hürlimann 1995.**

** *C. cookiensis* (Steph.) R.M.Schust. et Kachroo FIJ: Mizutani 1972 as *Cheilolejeunea parkinsonii*. OV: **TYPE** of *Enosmolejeunea parkinsonii*, Stephani 1914 as *Enosmolejeunea parkinsonii*, Miller 1960 as *Enosmolejeunea parkinsonii*, **Mizutani 1967** as *Cheilolejeunea parkinsonii*, Miller et al. 1983 also as *Enosmolejeunea parkinsonii*.

*** *C. decursiva* (Sande Lac.) R.M.Schust. VI: **Zhu & Lai 2005.**

*** *C. falsinervis* (Sande Lac.) R.M.Schust. et Kachroo FIJ: Thiers 1992a, Thiers 1992b, Yang & Lin 2008. VI: **Campbell 1971** as *Pycnolejeunea falsinervis*, Miller et al. 1983.

** *C. gardneri* (Mitt.) Mizut. OV: **Campbell 1971** as *Pycnolejeunea setifera*, Miller et al. 1983 as *Pycnolejeunea setifera*.

*** *C. intertexta* (Lindenb.) Steph. KA: **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Hürlimann 1995.**

*** *C. lindenbergii* (Gottsche) Mizut. TA: **Pócs et al. 2011.**

** *C. meyeniana* (Nees, Lindenb. et Gottsche) R.M.Schust. et Kachroo FIJ: Thiers 1992a, 1992b, Pócs et al. 1994. OV: **Jack & Stephani 1894** as *Archilejeunea meyeniana*, **Campbell 1971** as *Pycnolejeunea meyeniana*, Miller et al. 1983 also as *Lejeunea meyeniana*.

** *C. occlusa* (Herzog) T.Kodama et N.Kitag. VI: **Pócs et al. 2011.**

*** *C. trapezia* (Nees) R.M.Schust. et Kachroo FIJ: Zhu & Grolle 2004. KA: **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Campbell 1971** as *Pycnolejeunea trapezia*, Miller et al. 1983.

*** *C. trifaria* (Reinw., Blume et Nees) Mizut. KA: **Pócs et al. 2011.** OV: **Jack & Stephani 1894** as *Enosmolejeunea partiicola* ["*paritiicola*"], Miller et al. 1983 also as *Enosmolejeunea partiicola*. VI: **Campbell 1971** as *Enosmolejeunea trifaria*, Miller et al. 1983, **Hürlimann 1995.**

Chiastocaulon

*** *C. dendroides* (Nees) Carl FIJ: **Stephani 1903a** as *Plagiochila dendroides*, Jovet-Ast 1951, Bonner 1963b, Inoue 1984, 1986 both as *Plagiochila dendroides*, Piippo 1989a as *Plagiochila dendroides*. VI: **Inoue 1970**, **Hürlimann 1974**, Miller et al. 1983.

Chiloscyphus

** *C. graeffeanus* Steph. OV: **TYPE**, Stephani 1922 ["Oahu"], **Bonner 1963b**, Miller et al. 1983.

*** *C. muricatus* (Lehm.) J.J.Engel et R.M.Schust. FIJ: Frye & Clark 1944 as *Lophocolea muricata*, Schuster 1980b as *Lophocolea muricata*. VI: **Gibbs 1909** as *Lophocolea muricata*, Miller et al. 1983 as *Lophocolea muricata*, **Hürlimann 1998** as *Lophocolea muricata*.

** *C. parvus* (Steph.) J.J.Engel et R.M.Schust. FIJ: Hürlimann 1998 as *Lophocolea parva*. VA: **Campbell 1971** as *Lophocolea parva*, Miller et al. 1983 as *Lophocolea parva*. VI: **Campbell 1971** as *Lophocolea parva*, Miller et al. 1983 as *Lophocolea parva*.

** *C. samoanus* J.J.Engel et R.M.Schust. TA: **Campbell 1971** as *Lophocolea rectangulata*. VI: **Campbell 1971** as *Lophocolea rectangulata*, Miller et al. 1983 as *Lophocolea rectangulata*.

Cololejeunea

*** *C. aequabilis* (Sande Lac.) Schiffn. TA: **Pócs et al. 2011**. VI: **Pócs et al. 2011**.

*** *C. amphibola* B.M.Thiers TA: **Pócs et al. 2011**. VI: **Pócs et al. 2011**.

*** *C. angustiflora* (Steph.) Mizut. TA: **Pócs et al. 2011**.

*** *C. cardiocarpa* (Mont.) A.Evans VI: **Pócs et al. 2011**.

** *C. ceatocarpa* (Ångstr.) Steph. TA: **Pócs et al. 2011**. VI: **Hürlimann 1987**.

*** *C. cocoscola* Tixier KA: **Pócs et al. 2011**. TA: **Pócs et al. 2011**. VI: **Pócs et al. 2011**.

** *C. cordiflora* Steph. TA: **Pócs et al. 2011**. VI: **Pócs et al. 2011**.

* [3] *C. decliviloba* Steph. TA: **Campbell 1971**, Miller et al. 1983.

*** *C. diaphana* A.Evans TA: **Pócs et al. 2011**.

*** *C. equialbi* Tixier KA: **Pócs et al. 2011**. TA: **Pócs et al. 2011**.

*** *C. falcata* (Horik.) Benedix TA: **Pócs et al. 2011**. VA: **Pócs et al. 2011**. VI: **Pócs et al. 2011**.

*** *C. floccosa* (Lehm. et Lindenb.) Schiffn. FIJ: Pócs & Streimann 1999 [referring to Miller et al. 1983 who do not report it from Fiji]. TA: **Pócs et al. 2011**.

** *C. haskarliana* (Lehm.) Schiffn. var. *haskarliana* TA: **Pócs et al. 2011**. VI: **Hürlimann 1987** as *Cololejeunea hispidissima*.

** *C. hildebraudii* (Austin) Steph. TA: **Campbell 1971**, Miller et al. 1983. VI: **Campbell 1971**, Miller et al. 1983.

[3] *Cololejeunea decliviloba* is taxonomically doubtful and most likely should be placed in synonymy (Söderström et al. 2010).

** *C. hirta* Steph. TA: **Pócs et al. 2011.**

*** *C. huerlimannii* Tixier TA: **Pócs et al. 2011.**

*** *C. inflecteus* (Mitt.) Benedix KA: **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Pócs et al. 2011.**

* [4] *C. kapingaensis* H.A.Mill. VI: **Pócs et al. 2011.**

*** *C. kulenensis* Tixier KA: **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Pócs et al. 2011.**

** *C. lanciloba* Steph. KA: **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Pócs et al. 2011.**

** *C. latilobula* (Herzog) Tixier KA: **Pócs et al. 2011.**

*** *C. longifolia* (Mitt.) Benedix ex Mizut. VI: **Pócs et al. 2011.**

*** *C. metzgeriopsis* (K.I.Goebel) Gradst., R.Wilson, Ilk.-Borg. et Heinrichs FIJ: Eggers 2006 as *Metzgeriopsis pusilla*, Eggers & Pócs 2010. TA: **Campbell 1971** as *Metzgeriopsis pusilla*, Miller et al. 1983 as *Metzgeriopsis pusilla*. VI: Schuster 1969 as *Metzgeriopsis pusilla*, **Campbell 1971** as *Metzgeriopsis pusilla*, Miller et al. 1983 as *Metzgeriopsis pusilla*, **Gradstein et al. 2006.**

*** *C. minutissima* (Sm.) Schiffn. VI: **Hürlimann 1987.**

*** *C. obliqua* (Nees et Mont.) Schiffn. TA: **Pócs et al. 2011.** VI: **Campbell 1971** as *Cololejeunea nymannii*, Miller et al. 1983 as *Cololejeunea nymannii.*

* [5] *C. paucimarginata* Tixier TA: **Pócs et al. 2011.**

*** *C. peraffinis* (Schiffn.) Schiffn. FIJ: Hürlimann 1987 [incl. *C. ocelloides*], Pócs et al. 1994, Zhu & So 2001. OV: **Campbell 1971.** TA: **Campbell 1971.** VI: **Campbell 1971.**

** — var. *peraffinis* FIJ: Pócs & Streimann 1999. OV: Miller et al. 1983 [incl. *C. ocellata* and *C. ocelloides*]. TA: Miller et al. 1983 [incl. *C. ocellata* and *C. ocelloides*]. VI: Miller et al. 1983 [incl. *C. ocellata* and *C. ocelloides*].

** *C. polyantha* (Steph.) H.A.Mill. FIJ: **SYNTYPE** of *Lejeunea polyantha*, **Mitten 1873** as *Lejeunea polyantha*, Stephani 1916 as *Physocolea polyantha*, **Thiers 1983** as *Lejeunea polyantha*, Miller et al. 1983 also as *Physocolea polyantha* and *Lejeunea polyantha*, Geissler & Bischler 1985 as *Leptocolea vitiensis*, **1987** as *Lejeunea polyantha*, 1989 as *Physocolea polyantha*, **Tixier 1985.** TA: **Campbell 1971** as *Leptocolea vitiensis*, Miller et al. 1983 as *Leptocolea vitiensis* and *Cololejeunea vitiensis.* VI: **Campbell 1971** as *Leptocolea vitiensis*, Miller et al. 1983 as *Cololejeunea vitiensis* and *Leptocolea vitiensis.*

*** *C. pseudoserrata* Tixier TA: **Pócs et al. 2011.**

*** *C. raduliloba* Steph. TA: **Pócs et al. 2011.** VI: **Pócs et al. 2011.**

*** *C. schmidtii* Steph. TA: **Pócs et al. 2011.** VI: **Pócs et al. 2011.**

[4] *Cololejeunea kapingaensis* is treated as a new synonym of *Cololejeunea planissima* (Mitt.) Abeyw. (widespread in east and south-east Asia and Micronesia) by Inoue & Iwatsuki (1969) but Pócs et al. (2011) recognise it.

[5] *C. paucimarginata* may be a form of *C. raduliloba* (Söderström et al. 2010), but Pócs et al. (2011) recognise it.

*** *C. sintenisii* (Steph.) Pócs VI: **Pócs et al. 2011.**

*** *C. societatis* Tixier TA: **Pócs et al. 2011.**

*** *C. stylosa* (Steph.) Steph. ex Mizut. VI: **Pócs et al. 2011.**

** *C. trichomanis* (Gottsche) Steph. FIJ: Pócs & Ninh 2005. VA: **Campbell 1971** as *Leptocolea goebelii*, Miller et al. 1983 as *Cololejeunea goebelii* and *Leptocolea goebelii*. VI: **Campbell 1971** as *Leptocolea goebelii*, Miller et al. 1983 as *Leptocolea goebelii*.

** *C. tridentata* Tixier TA: **Pócs et al. 2011.**

** *C. veillonii* Tixier VI: **Hürlimann 1987.**

*** *C. wightii* Steph. KA: **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Pócs et al. 2011.**

Colura

*** *C. acroloba* (Mont. ex Steph.) Ast FIJ: **Gradstein et al. 2006, Wilson et al. 2007.** VI: **Pócs et al. 2011.**

*** *C. ari* (Steph.) Steph. FIJ: Hürlimann 1987, Zhu & So 2001, Eggers 2006, Eggers & Pócs 2010. OV: **Campbell 1971,** Miller et al. 1983. TA: **Campbell 1971,** Miller et al. 1983, **Pócs & Eggers 2007.** VI: **Campbell 1971,** Miller et al. 1983.

*** *C. brevistyla* Herzog TA: **Pócs et al. 2011.** VI: **Pócs et al. 2011.**

*** *C. conica* (Sande Lac.) K.I.Goebel FIJ: Hürlimann 1987, Pócs & Streimann 1999, Zhu & So 2001. OV: **Campbell 1971** as *Colura acutifolia*, Miller et al. 1983. TA: **Pócs & Eggers 2007.** VI: **Pócs & Eggers 2007.**

*** *C. corynophora* (Nees, Lindenb. et Gottsche) Trevis. FIJ: Zhu & So 2001. TA: **Campbell 1971,** Miller et al. 1983. VI: **Jovet-Ast 1954, Campbell 1971,** Miller et al. 1983.

*** *C. crispiloba* Ast VI: **Pócs & Eggers 2007.**

*** *C. cristata* Ast KA: **Pócs & Eggers 2007.**

** [6] *C. imperfecta* Steph. FIJ: **Gradstein et al. 2006, Wilson et al. 2007.**

*** *C. leratii* (Steph.) Steph. FIJ: **SYNTYPE** of *Lejeunea apiculata*, **Schiffner 1890** as *Lejeunea apiculata*, **Bonner 1963b** as *Colurolejeunea apiculata*, Miller et al. 1983 also as *Colura apiculata* and *Lejeunea apiculata*, **Geissler & Bischler 1987** as *Lejeunea superba* var. *apiculata*, Hürlimann 1987. TA: **Pócs & Eggers 2007.** VI: **Pócs & Eggers 2007.**

*** *C. pluridentata* Ast VI: **Campbell 1971,** Miller et al. 1983, **Pócs & Eggers 2007.**

*** *C. queenslandica* B.M.Thiers VI: **Pócs & Eggers 2007.**

*** *C. superba* (Mont.) Steph. FIJ: **Mitten 1873** as *Lejeunea superba*, Miller et al. 1983. VI: **Hürlimann 1987.**

*** *C. tenuicornis* (A.Evans) Steph. VI: **Pócs et al. 2011.**

*** *C. vitiensis* Pócs et J.Eggers FIJ: **TYPE,** von Konrat et al. 2010b. TA: **Pócs & Eggers 2007.** VI: **Pócs & Eggers 2007.**

[6] *Colura imperfecta* is very close to *C. leratii* (Söderström et al. 2010).

Conoscyphus

*** *C. trapezioides* (Sande Lac.) Schiffn. VI: **Hürlimann 1998**.

Cuspidatula

*** *C. contracta* (Reinw., Blume et Nees) Steph. FIJ: Stephani 1897 as *Anastrophyllum vitiense*, Schiffner 1898, 1900 both as *Anastrophyllum contractum*, Bonner 1963b as *Cuspidatula vitiensis*, Grolle 1969 as *Cuspidatula vitiensis*, **1971**, Bizot & Pócs 1974, Váňa & Piippo 1989b as *Jamesoniella contracta*, Váňa 1991b as *Jamesoniella contracta*, Schuster 2002. VI: **TYPE** of *Anastrophyllum vitiense*, **Jack & Stephani 1894** as *Anastrophyllum vitiense*, **Stephani 1901** as *Cuspidatula vitiensis*, **Bonner 1962b** as *Anastrophyllum vitiense*, **Hürlimann 1974**, Miller et al. 1983 also as *Anastrophyllum vitiense* and *Cuspidatula vitiensis*.

Dendrolejeunea

*** *D. fruticosa* (Lindenb. et Gottsche) Lacout. FIJ: Verdoorn 1934 as *Thysananthus fruticosus*, Miller et al. 1983 as *Dendrolejeunea vittata*. VI: **Jack & Stephani 1894** as *Thysanolejeunea fruticosa*, Miller et al. 1983 as *Thysananthus fruticosus*.

Denotarisia

*** *D. linguifolia* (De Not.) Grolle FIJ: Schiffner 1898 as *Jamesoniella ovifolia* and *Anastrophyllum graeffei*, **Stephani 1901** as *Jamesoniella ovifolia*, Grolle 1968 as *Jamesoniella ovifolia*, **1971**, Váňa & Piippo 1989b, Váňa 1991b, Schuster 2002. OV: **TYPE** of *Anastrophyllum graeffei*, **Jack & Stephani 1894** as *Anastrophyllum graeffei*, **Bonner 1962b** as *Anastrophyllum graeffei*, Miller et al. 1983 also as *Jamesoniella ovifolia* and *Anastrophyllum graeffei*. VI: **Hürlimann 1989**.

Diplasiolejeunea

*** *D. cavifolia* Steph. TA: **Pócs et al. 2011**. VI: **Campbell 1971** as *Diplasiolejeunea brachyclada*, Miller et al. 1983.

Drepanolejeunea

*** *D. angustifolia* (Mitt.) Grolle VI: **Hürlimann 1995**.

*** *D. dactylophora* (Nees, Lindenb. et Gottsche) Schiffn. VI: **Campbell 1971**, Miller et al. 1983.

* [7] *D. serricalyx* Herzog FIJ: Pócs et al. 1994. VI: **Campbell 1971**, Miller et al. 1983.

* [8] *D. tenera* K.I.Goebel FIJ: **Hürlimann 1995**. VI: **Campbell 1971**, Miller et al. 1983.

*** *D. ternatensis* (Gottsche) Spruce ex Schiffn. FIJ: Mizutani 1978a, 1978b, Udar & Awasthi 1982 as *Drepanolejeunea ternatensis* var. *ternatensis*, Miller et al. 1983 as *Drepanolejeunea uncinata*, Hürlimann 1995 as *Drepanolejeunea ternatensis* var. *lancispina*, Bapna & Kachroo 2000b as *Drepanolejeunea ternatensis* var. *ternatensis*. OV: **Jack & Stephani 1894**, **Herzog 1939** as *Drepanolejeunea ternatensis* var. *ternatensis*, Miller et al. 1983 as *Drepanolejeunea ternatensis* var. *ternatensis*. VI:

[7] *Drepanolejeunea serricalyx* is doubtfully distinct from *D. thwaitesiana* (Mitt.) Steph. which is widespread in SE Asia (Söderström et al. 2010).

[8] *Drepanolejeunea tenera* is doubtfully distinct from *D. pentadactyla* (Mont.) Steph. which is widespread in the Paleotropics and reported from many areas in the Pacific, but not yet from Fiji (Söderström et al. 2010).

Campbell 1971 as *Drepanolejeunea ternatensis* var. *lancispina*, Miller et al. 1983 as *Drepanolejeunea ternatensis* var. *lancispina* and var. *ternatensis*, Hürlimann 1995 as *Drepanolejeunea ternatensis* var. *ternatensis*.

** *D. tricornua* Herzog TA: **Pócs et al. 2011.**

*** *D. vesiculosa* (Mitt.) Steph. VI: **Campbell 1971**, Miller et al. 1983.

Dumortiera

*** [9]*D. hirsuta* (Sw.) Nees FIJ: **Mitten 1873** as *Dumortiera trichocephala*, Miller et al. 1983 as *Dumortiera trichocephala*. OV: **Schiffner 1890**. TA: **Campbell 1971,** Miller et al. 1983 as *Dumortiera hirsuta* var. *hirsuta*. VI: **Gibbs 1909** as *Dumortiera trichocephala* and *Dumortiera velutina*, **Campbell 1971**, Miller et al. 1983 as *Dumortiera hirsuta* var. *hirsuta*.

Frullania

** *F. ampullifera* J.B.Jack et Steph. FIJ: Koike 1994, **Hentschel et al. 2009**. KA: **TYPE, Jack & Stephani 1894, Stephani 1894, 1910, Bonner 1965, Pócs 2008b.** OV: **Verdoorn 1930, Hattori 1981,** Miller et al. 1983, Pócs 2008b. TA: **Pócs 2008b.** VI: **Campbell 1971,** Miller et al. 1983, **Hattori 1985**, Pócs 2008b.

** *F. angustistipa* Steph. KA: **Pócs 2008b** as *Frullania angulistipa*.

*** *F. apiculata* (Reinw., Blume et Nees) Nees FIJ: **Hentschel et al. 2009**. KA: **Pócs 2008b**. OV: **Jack & Stephani 1894**, Campbell 1971. TA: **Verdoorn 1937, Pócs 2008b.** VI: **Hattori 1985**.

** — var. *apiculata* FIJ: **Mitten 1873** as *Frullania pacificae* ["*pacifica*"], Stephani 1897, 1916 both as *Frullania pacificae*. OV: Miller et al. 1983. TA: Miller et al. 1983. VI: Miller et al. 1983 also as *Frullania pacificae*,.

** — var. *goebelii* Schiffn. OV: **Campbell 1971**, Miller et al. 1983. TA: **Campbell 1971**, Miller et al. 1983. VI: **Campbell 1971**, Miller et al. 1983.

*** *F. arecae* (Spreng.) Gottsche var. *arecae* FIJ: **Yuzawa 1991**.

** *F. auriculata* S.Hatt. FIJ: Pócs 2008b. VI: **TYPE, Hattori 1985, Engel 1992, Crosby & Engel 2006.**

** *F. baladina* Gottsche ex Steph. FIJ: **Hentschel et al. 2009**. KA: **Pócs 2008b**. VI: **Pócs 2008b**.

** *F. capillaris* Steph. FIJ: Pócs 2008b. VI: **Hattori 1985.**

*** *F. chevalieri* (R.M.Schust.) R.M.Schust. TA: **Pócs 2008b.**

*** *F. cordistipula* (Reinw., Blume et Nees) Dumort. FIJ: **Mitten 1862**.

** *F. deflexa* Mitt. FIJ: **TYPE, TYPE** of *Frullania pendula*, **Mitten 1862, Austin 1872** as *Frullania pendula*, **Mitten 1873**, Stephani 1911, 1916, Verdoorn 1930, **Bonner 1965** also as *Frullania pendula*, Hattori 1977, 1980, 1986a, **Thiers 1983**, Miller et al. 1983 as *Frullania pendula*. OV: **TYPE** of *Frullania varians*, **Jack & Stephani 1894, Bonner 1965** as *Frullania varians*, Miller et al. 1983 also as *Frullania varians*. TA: **Hattori 1980**, Miller et al. 1983. VA: **Campbell 1971**, Miller et al. 1983. VI: **Campbell 1971, Hattori 1980, 1985**, Miller et al. 1983, **Pócs 2008b**.

[9] *Dumortiera hirsuta* is a variable species and recent studies (N.Salazar-Allen, pers. comm. 2009) indicate that more than one taxon may be involved. The most commonly recognised infrataxon is subsp. *nepalensis* (Taylor) R.M.Schust. and this is also reported from Fiji, but the taxonomy needs clarification.

** *F. epiphylla* S.Hatt. subsp. *fijiensis* S.Hatt. FIJ: Pócs 2008b. VI: **TYPE, Hattori 1985, Engel 1992, Crosby & Engel 2006.**

*** *F. ericoides* (Nees) Mont. FIJ: **Stephani 1910** as *Frullania vesiculosa*, Bonner 1965 as *Frullania vesiculosa*, Miller et al. 1983 as *Frullania vesiculosa*. VI: Miller et al. 1983 as *Frullania squarrosa* [Viti Levu with a "?"], **Pócs 2008b.**

*** *F. gaudichaudii* (Nees et Mont.) Nees et Mont. FIJ: **Hentschel et al. 2009.** KA: **Pócs 2008b.** TA: **Verdoorn 1937, Campbell 1971**, Miller et al. 1983, **Pócs 2008b.** VA: **Campbell 1971**, Miller et al. 1983. VI: **Hattori 1985**, Hattori 1986a.

*** *F. gracilis* (Reinw., Blume et Nees) Gottsche, Lindenb. et Nees TA: **Pócs 2008b.**

** *F. immersa* Steph. FIJ: Pócs 2008b. VA: **Verdoorn 1937, Campbell 1971**, Miller et al. 1983. VI: **Campbell 1971** as *Frullania rechingeri*, Miller et al. 1983 also as *Frullania rechingeri*, **Hattori 1985**, 1986a.

*** *F. intermedia* (Reinw., Blume et Nees) Dumort. FIJ: Clark & Frye 1948, Verdoorn 1930, Bonner 1965, Inoue & Miller 1965, Bapna & Kachroo 2000b, **Hentschel et al. 2009.** KA: **Verdoorn 1937**, Miller et al. 1983. OV: Miller et al. 1983. TA: Miller et al. 1983. VI: Miller et al. 1983.

** — subsp. *intermedia* FIJ: **TYPE** of *Frullania stellatitexta*, Stephani 1911 as *Frullania stellatitexta*, *Frullania angulosa* and *Frullania khedingiana* ["*kehdingiana*"], Verdoorn 1930 as *Frullania angulosa* and *Frullania stellatitexta*, Bonner 1965 as *Frullania khedingiana* ["*kedingiana*"] and *Frullania angulosa* Mitt. KA: **Campbell 1971** as *Frullania intermedia* f. *intermedia*. OV: **Verdoorn 1928** as *Frullania angulosa*, **Bonner 1965** as *Frullania stellatitexta*, **Hattori 1980**, Miller et al. 1983 as *Frullania stellatitexta*. TA: **Hattori 1980**. VI: **Campbell 1971** as *Frullania intermedia* f. *intermedia*, **Campbell 1971** as *Frullania intermedia* f. *billardieriana*, **Hattori 1980, 1985**, Miller et al. 1983 as *Frullania intermedia* f. *billardieriana*.

** — var. *non-apiculata* S.Hatt. FIJ: Hattori & Streimann 1985, Hattori 1986a. TA: **Pócs 2008b.** VI: **Hattori 1985.**

*** *F. meyeniana* Lindenb. FIJ: **Hentschel et al. 2009.**

*** *F. neurota* Taylor FIJ: Pócs 2008b. VI: **Campbell 1971**, Miller et al. 1983.

*** *F. nodulosa* (Reinw., Blume et Nees) Nees FIJ: **Mitten 1873**, Schiffner 1898, **Hentschel et al. 2009.** LA: **Hattori 1980** as *Frullania nodulosa* var. *nodulosa*, Miller et al. 1983. VA: **Hattori 1980** as *Frullania nodulosa* var. *nodulosa*. VI: **TYPE** of *Frullania inflatistipula*, **Jack & Stephani 1894, Verdoorn 1937, Bonner 1965** as *Frullania inflatistipula*, **Campbell 1971, Hattori 1980** as *Frullania nodulosa* var. *nodulosa*, **1985**, Miller et al. 1983 also as *Frullania inflatistipula*, **Pócs 2008b.**

** *F. novocurvirostris* S.Hatt. FIJ: Bonner 1965 as *Frullania curvirostris*, Hattori 1984, 1986a. KA: **Pócs 2008b.** OV: **TYPE** of *Frullania curvatirostra*, **Jack & Stephani 1894** as *Frullania curvirostris*, **Stephani 1894** as *Frullania curvirostris*, 1910 as *Frullania curvirostris* and *Frullania curvatirostra*., **Bonner 1965** as *Frullania curvatirostra*, **Campbell 1971** as *Frullania curvirostris*, **Hattori 1981**, Miller et al. 1983 also as *Frullania curvirostris*, Pócs 2008b. VI: **Campbell 1971** as *Frullania curvirostris*, Miller et al. 1983 also as *Frullania curvirostris*, **Hattori 1985.**

** *F. parhamii* (R.M.Schust.) R.M.Schust. ex von Konrat, L.Söderstr. et A.Hagborg FIJ: Schuster 1964, 1969 both as *Neohattoria parhamii*, Hattori et al. 1977, 1986a both as *Schusterella parhamii*, Geissler & Bischler 1990 as *Schusterella parhamii*, Pócs 2008b, **Hentschel et al. 2009**. VA: **TYPE** of *Neohattoria parhamii*, **Schuster 1963, 1970** both as *Neohattoria parhamii*, Hattori et al. 1972 as *Schusterella parhamii*, Miller et al. 1983 as *Schusterella parhamii* and *Neohattoria parhamii*, **Geissler & Bischler 1989** as *Neohattoria parhamii*, **von Konrat et al. 2006** as *Neohattoria parhamii*.

*** *F. ramuligera* (Nees) Mont. FIJ: Hattori & Lin 1985 [with a "?"], Bai 2002. VI: **Campbell 1971**, Miller et al. 1983.

* [10]*F. serrata* Gottsche FIJ: **TYPE** of *Frullania grossispica*, **TYPE** of *Frullania meteoroides*, **Mitten 1862, 1873** both as *Frullania meteoroides*, Stephani 1897 as *Frullania meteoroides*, 1911 as *Frullania meteoroides* and *Frullania grossispica*, 1916 as *Frullania meteoroides*, Verdoorn 1930, **Bonner 1965** as *Frullania grossispica* and *Frullania meteoroides*, Hattori 1973, **Thiers 1983** as *Frullania meteoroides*, Miller et al. 1983 as *Frullania meteoroides*, Pócs 2008b, Singh et al. 2008. OV: **Jack & Stephani 1894** as *Frullania meteoroides*, Miller et al. 1983. VI: **Verdoorn 1937, Campbell 1971**, Miller et al. 1983 also as *Frullania grossispica* [Viti Levu with a "?"], **Hattori 1985**.

*** *F. ternatensis* Gottsche FIJ: Hattori 1982, Hattori & Streimann 1985, Hattori & Piippo 1986. TA: **Pócs 2008b**. VI: **Hattori 1975b**, Miller et al. 1983, **Pócs 2008b**.

** — var. *non-appendiculata* S.Hatt. FIJ: Hattori 1988. VI: **Hattori 1985**.

** — var. *ternatensis* FIJ: Hattori 1985.

** *F. trichodes* Mitt. FIJ: **TYPE, Mitten 1862, 1873, Bonner 1965, Thiers 1983**, Hattori & Piippo 1986, Hattori 1988. KA: **Pócs 2008b**. VI: Miller et al. 1983 [Viti Levu with a "?"], **Hattori 1985** as *Frullania vethii*, **Pócs 2008b**.

** *F. vaga* Mitt. FIJ: **TYPE, Mitten 1873**, Stephani 1911, Verdoorn 1930, **Bonner 1965**, Hattori 1986b, Pócs 2008b. VI: Miller et al. 1983 [Viti Levu with a "?"].

** *F. vivipara* Pócs FIJ: von Konrat et al. 2010b. KA: **TYPE, Pócs 2008b**.

Harpalejeunea

*** *H. filicuspis* (Steph.) Mizut. FIJ: Grolle 1979. KA: **Pócs et al. 2011**. OV: **Campbell 1971** as *Drepanolejeunea riddleana*, Miller et al. 1983 as *Drepanolejeunea riddleana* and *Drepanolejeunea filicuspis*. TA: **Pócs et al. 2011**. VI: **Pócs et al. 2011**.

* [11]*H. vitrea* Herzog VA: **TYPE, Herzog 1951a**, Miller et al. 1983, **Grolle & Reiner-Drehwald 1999**.

[10] *Frullania serrata* is probably conspecific with *F. cordistipula*. The two differ only by the degree of dentation of the female bracts (Söderström et al. 2010).

[11] *Harpalejeunea vitrea* is a *Lejeunea* sp. (non *L. vitrea* Nees et al.) according to Grolle & Reiner-Drehwald (1999).

Herbertus

** *H. longifissus* Steph. VI: **Miller 1968** also as *Herbertus tutuilanus*, Miller et al. 1983 also as *Herbertus tutuilanus*.

Heteroscyphus

*** *H. argutus* (Reinw., Blume et Nees) Schiffn. FIJ: **Mitten 1861** as *Chiloscyphus argutus*, Stephani 1897 as *Chiloscyphus argutus*, Piippo 1985. OV: **Jack & Stephani 1894** as *Chiloscyphus argutus*, Miller et al. 1983. VA: **Campbell 1971**, Miller et al. 1983. VI: **Gibbs 1909** as *Chiloscyphus argutus*, **Campbell 1971**, Miller et al. 1983.

* — var. *argutus* FIJ: **Mitten 1873** as *Chiloscyphus endlicherianus*.

*** *H. aselliformis* (Reinw., Blume et Nees) Schiffn. FIJ: **SYNTYPE** of *Chiloscyphus confluens*, **Mitten 1873** as *Chiloscyphus confluens*, Stephani 1897, 1916 both as *Chiloscyphus confluens*, **Bonner 1963b** as *Chiloscyphus confluens*, **Grolle 1965** as *Chiloscyphus aselliformis*, Kitagawa 1979, 1981 both as *Chiloscyphus aselliformis*, **Grolle 1980**, **Thiers 1983** as *Chiloscyphus confluens*, Piippo 1985, 1989b, Hürlimann 1998, Yamada & Hayashi 2003. OV: **Jack & Stephani 1894** as *Chiloscyphus confluens*, **Campbell 1971** as *Heteroscyphus confluens*, Miller et al. 1983 as *Heteroscyphus confluens*. VI: **Campbell 1971**, Miller et al. 1983 also as *Chiloscyphus aselliformis*, **Hürlimann 1998**.

*** *H. coalitus* (Hook.) Schiffn. FIJ: Piippo 1985. VI: **Campbell 1971** as *Heteroscyphus communis*, Miller et al. 1983 as *Heteroscyphus communis* and *Chiloscyphus communis*.

** *H. graeffei* (J.B.Jack et Steph.) Grolle FIJ: Stephani 1897 as *Lophocolea graeffei*, **Engel & Schuster 1985** ad *Chiloscyphus graeffei*. OV: **Campbell 1971** as *Lophocolea graeffei*, Miller et al. 1983 as *Lophocolea graeffei*. VI: **SYNTYPE** of *Lophocolea graeffei*, **Jack & Stephani 1894** as *Lophocolea graeffei*, **Campbell 1971** as *Lophocolea graeffei*, Miller et al. 1983 as *Lophocolea graeffei*, **Geissler & Bischler 1985** as *Lophocolea graeffei*.

*** *H. succulentus* (Gottsche) Schiffn. FIJ: Miller et al. 1983 as *Heteroscyphus concinnus*. TA: **Campbell 1971** as *Heteroscyphus concinnus*, Miller et al. 1983 also as *Chiloscyphus succulentus*.

Hymenophyton

*** *H. flabellatum* (Labill.) Dumort. ex Trevis. FIJ: **Evans 1925**, Arnell 1958, Schuster 1969, Miller et al. 1983, Furuki 2002, Pfeiffer 2000.

Jamesoniella

*** [12] *J. flexicaulis* (Nees) Schiffn. FIJ: **Mitten 1873** as *Jungermannia flexicaulis*, Miller et al. 1983 as *Crossogyna flexicaulis*. VA: **Campbell 1971**. VI: **Campbell 1971**, **Hürlimann 1974**.

Jubula

** *J. hutchinsiae* (Steph.) Verd. subsp. *javanica* (Steph.) Verd. VI: **Campbell 1971**, Miller et al. 1983.

[12] The genus *Jamesoniella* was transferred to *Syzygiella* and *Cuspidatula* by Feldberg et al. (2010) but *J. flexicaulis* was not included in their study and they did not transfer it.

Kurzia

*** *K. gouyotricha* (Sande Lac.) Grolle VA: **Pócs et al. 2011.**

Lejeunea

*** *L. alata* Gottsche TA: **Pócs et al. 2011.** VI: **Pócs et al. 2011.**

*** *L. anisophylla* Mont. KA: **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Pócs et al. 2011.**

** *L. apiculata* Sande Lac. VI: **Pócs et al. 2011.**

*** *L. capensis* Gottsche FIJ: Schuster 1984 as *Lejeunea caespitosa*, Hürlimann 1993 as *Lejeunea caespitosa*. VI: **Jones 1972** as *Lejeunea caespitosa*, **Schuster 1980b** as *Lejeunea caespitosa*, Miller et al. 1983 as *Lejeunea caespitosa*.

** *L. caviloba* (Steph.) Steph. ex Besch. VI: **Hürlimann 1993.**

** *L. cocoes* Mitt. KA: **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Pócs et al. 2011.**

** *L. crassiretis* Mitt. FIJ: **TYPE, Mitten 1873**, Stephani 1915, **Thiers 1983, Geissler & Bischler 1987.** VI: **Campbell 1971**, Miller et al. 1983.

** *L. cucullíflora* (Steph.) Mizut. FIJ: **Stephani 1896**, 1914 both as *Taxilejeunea cucullíflora*, Mizutani 1978a, Geissler & Bischler 1987, **1990** as *Taxilejeunea cucullíflora*, Hürlimann 1995. OV: **TYPE** of *Taxilejeunea cucullíflora*, **Eifrig 1937** as *Taxilejeunea cucullíflora*, **Mizutani 1976, Grolle 1979**, Miller et al. 1983 also as *Taxilejeunea cucullíflora*, **Grolle 1988.** VA: **Campbell 1971** as *Taxilejeunea cucullíflora*, Miller et al. 1983 also as *Taxilejeunea cucullíflora*. VI: **Campbell 1971** as *Taxilejeunea cucullíflora*, Miller et al. 1983 also as *Taxilejeunea cucullíflora*.

*** *L. discreta* Lindenb. TA: **Pócs et al. 2011.** VI: **Hürlimann 1993.**

*** *L. exilis* (Reinw., Blume et Nees) Grolle TA: **Pócs et al. 2011.** VI: **Pócs et al. 2011.**

*** *L. flava* (Sw.) Nees FIJ: **Mitten 1873** as *Lejeunea uvifera*, Stephani 1897 as *Euosmolejeunea uvifera*, Miller et al. 1983 as *Euosmolejeunea uvifera*. OV: **Campbell 1971**, Miller et al. 1983. TA: **Pócs et al. 2011.** VI: **Campbell 1971**, Miller et al. 1983.

** — subsp. *orientalis* R.M.Schust. VI: **Hürlimann 1993.**

** *L. gracilipes* (Taylor) Spruce TA: **Campbell 1971** as *Taxilejeunea gracilipes*, Miller et al. 1983 also as *Taxilejeunea gracilipes*. VA: **Campbell 1971** as *Taxilejeunea gracilipes*, Miller et al. 1983 also as *Taxilejeunea gracilipes*. VI: **Campbell 1971** as *Taxilejeunea gracilipes*, Miller et al. 1983 also as *Taxilejeunea gracilipes*.

*** *L. lumbricoides* (Nees) Nees OV: **TYPE** of *Hygrolejeunea graeffeana* ["Samoa, Ovalau"], **Stephani 1914** as *Hygrolejeunea graeffeana* ["Samoa, Ovalau"], **Eifrig 1937** as *Taxilejeunea lumbricoides*, **Bonner 1966** as *Hygrolejeunea graeffeana* ["Samoa, Ovalau"], Grolle & Schultze-Motel 1973, Miller et al. 1983 also as *Hygrolejeunea graeffeana*. VI: **Hürlimann 1993.**

** *L. micholitzii* Mizut. KA: **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Hürlimann 1993.**

** *L. microloba* Taylor OV: **Grolle 1979**, Miller et al. 1983.

** *L. mimula* Hürl. FIJ: **Hürlimann 1995.** VI: **Hürlimann 1993.**

** *L. nietneri* (Steph.) Steph. VI: **Campbell 1971**, Miller et al. 1983.

** *L. patersonii* (Steph.) Steph. OV: **TYPE** of *Microlejeunea samoana*, **Miller et al. 1963b**, 1983 both as *Microlejeunea samoana* Steph. VI: **Hürlimann 1993.**

** *L. procumbens* Mitt. FIJ: **TYPE, Mitten 1873**, Stephani 1914 as *Hygrolejeunea procumbens*, Bonner 1965 as *Hygrolejeunea procumbens*, **Thiers 1983, Geissler & Bischler 1987.** VI: Miller et al. 1983 also as *Hygrolejeunea procumbens* [Viti Levu with a "?"].

* [13] *L. sinclairii* Mitt. FIJ: **TYPE, Mitten 1862, Mitten 1873** as *Bryopteris sinclairii*, Stephani 1911 as *Thysananthus sinclairii*, Bonner 1963a as *Bryopteris sinclairii*, **Thiers 1983**, Miller et al. 1983 also as *Lejeunea sinclairii* and *Thysananthus sinclairii*, **Geissler & Bischler 1987**, 1990 as *Thysananthus sinclairii*.

*** *L. sordida* (Nees) Nees FIJ: Zhu & So 2001, Yang & Lin 2009, Lee et al. 2011. KA: **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Hürlimann 1993.**

** *L. subigiensis* (Steph.) Steph. OV: **Campbell 1971**, Miller et al. 1983. VI: **Campbell 1971**, Miller et al. 1983.

*** *L. umbilicata* (Nees) Nees FIJ: Hürlimann 1995. OV: **Jack & Stephani 1894** as *Taxilejeunea umbilicata*, **Eifrig 1937** as *Taxilejeunea umbilicata*, Miller et al. 1983. TA: **Pócs et al. 2011.** VI: **Jack & Stephani 1894** as *Taxilejeunea umbilicata*, Miller et al. 1983.

Lepicolea

*** *L. rara* (Steph.) Grolle FIJ: Grolle 1965, 1968 both as *Lepicolea loriana*, Miller et al. 1983 as *Lepicolea loriana*, Piippo 1984a, Schuster 2000. TA: **Pócs et al. 2011.** VI: **Hürlimann 1983** as *Lepicolea loriana*.

Lepidolejeunea

*** *L. bidentula* (Steph.) R.M.Schust. FIJ: **SYNTYPE** of *Hygrolejeunea decurrens*, **Stephani 1896** as *Hygrolejeunea decurvifolia*, 1914 as *Pycnolejeunea bidentula*, Jovet-Ast & Tixier 1962 as *Pycnolejeunea bidentula*, Bonner 1966 as *Hygrolejeunea decurvifolia*, Mizutani 1967 as *Pycnolejeunea bidentula* [with a "?"], Tixier 1970 as *Pycnolejeunea bidentula*, Miller et al. 1983 as *Hygrolejeunea decurvifolia*, Geissler & Bischler 1989 as *Pycnolejeunea decurvifolia*, Zhu & So 2001. KA: **Pócs et al. 2011.** OV: **Jack & Stephani 1894** as *Pycnolejeunea bidentula*, Miller et al. 1983 as *Pycnolejeunea bidentula*. TA: **Pócs et al. 2011.** VI: **Campbell 1971** as *Pycnolejeunea bidentula*, Miller et al. 1983 as *Pycnolejeunea bidentula*, **Hürlimann 1995.**

*** — var. *bidentula* OV: **Piippo 1986.**

*** *L. borneensis* (Steph.) R.M.Schust. TA: **Pócs et al. 2011.** VI: **Pócs et al. 2011.**

*** *L. graeffei* (J.B.Jack et Steph.) R.M.Schust. FIJ: Stephani 1911 as *Archilejeunea graeffei*, Horikawa 1943 as *Pycnolejeunea graeffei*, Geissler & Bischler 1987 as *Lejeunea graeffei*, 1989 as *Pycnolejeunea graeffei*. OV: **TYPE** of *Archilejeunea graeffei*, **Jack & Stephani 1894** as *Archilejeunea graeffei*, **Bonner 1962b** as *Archilejeunea graeffei*, **Mizutani 1972** as *Pycnolejeunea graeffei*, Miller et al. 1983 as *Pycnolejeunea graeffei* and *Archilejeunea graeffei*, **Piippo 1986**, TA: **Pócs et al. 2011.** VI: **Hürlimann 1995.**

*** *L. integristipula* (J.B.Jack et Steph.) R.M.Schust. FIJ: **Stephani 1896** as *Hygrolejeunea*

[13] *Lejeunea sinclairii* may be conspecific with *L. flava* (Grolle 1982). It is treated as a synonym of *Caudalejeunea reniloba* and *Thysananthus fruticosus* (=*Dendrolejeunea fruticosa*) by Miller et al. (1983).

devexiloba, Inoue & Miller 1965 as *Hygrolejeunea devexiloba*, Mizutani 1978a both as *Pycnolejeunea integristipula*, Miller et al. 1983 as *Hygrolejeunea devexiloba*, Geissler & Bischler 1990 as *Symbiezidium integristipulum*, **Wilson et al. 2007.** KA: **Pócs et al. 2011.** OV: **TYPE** of *Pycnolejeunea integristipula*, **Jack & Stephani 1894** as *Pycnolejeunea integristipula*, **Stephani 1912** as *Symbiezidium integristipulum*, **Campbell 1971** as *Symbiezidium integristipulum*, **Mizutani 1972** as *Pycnolejeunea integristipula*, Miller et al. 1983 as *Pycnolejeunea integristipula* and *Symbiezidium integristipulum*, **Piippo 1986**, **Geissler & Bischler 1987** as *Lejeunea integristipula*, **1989** as *Pycnolejeunea integristipula*, **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Campbell 1971** as *Symbiezidium integristipulum*, Miller et al. 1983 as *Symbiezidium integristipulum* and *Pycnolejeunea integristipula*.

*** *L. involuta* (Gottsche) Grolle FIJ: **Mitten 1873** as *Lejeunea hawaiiensis*, Miller et al. 1983 as *Harpalejeunea owaihiensis*.

Leptolejeunea

*** *L. elliptica* (Lehm. et Lindenb.) Schiffn. FIJ: Schuster 1984, Hürlimann 1995 as *Leptolejeunea subacuta*, Pócs & Streimann 1999 as *Leptolejeunea subacuta*. TA: **Campbell 1971** as *Leptolejeunea subacuta*, Miller et al. 1983 as *Leptolejeunea subacuta*. VI: **Campbell 1971** as *Leptolejeunea subacuta*, Miller et al. 1983 as *Leptolejeunea subacuta*.

*** *L. epiphylla* (Mitt.) Steph. VA: Miller et al. 1983 as *Lejeunea polyrhiza*. VI: **Campbell 1971**, Miller et al. 1983.

** *L. maculata* (Mitt.) Schiffn. FIJ: Pócs & Streimann 1999 as *Leptolejeunea rhombifolia*, Eggers & Pócs 2010 as *Leptolejeunea rhombifolia*. OV: **Campbell 1971** as *Leptolejeunea schiffneri* and *Leptolejeunea radiata*, Miller et al. 1983 as *Leptolejeunea radiata* and *Leptolejeunea schiffneri*. TA: **Campbell 1971** as *Leptolejeunea radiata* and *Leptolejeunea schiffneri*, Miller et al. 1983 as *Leptolejeunea radiata* and *Leptolejeunea schiffneri*. VA: **Campbell 1971** as *Leptolejeunea radiata*, Miller et al. 1983 as *Leptolejeunea radiata*. VI: **Campbell 1971** as *Leptolejeunea schiffneri*, *Leptolejeunea radiata* and *Leptolejeunea rhombifolia*, Miller et al. 1983 as *Leptolejeunea rhombifolia*, *Leptolejeunea radiata* and *Leptolejeunea schiffneri*, **Hürlimann 1995**.

** *L. tripuncta* (Mitt.) Steph. FIJ: **TYPE** of *Lejeunea tripuncta*, **Mitten 1873** as *Lejeunea tripuncta*, Stephani 1913, **Thiers 1983** as *Lejeunea tripunctata*, Miller et al. 1983 as *Lejeunea tripuncta*, Geissler & Bischler 1985, **1987** as *Lejeunea tripuncta* Mitt. VI: Miller et al. 1983 [Viti Levu with a "?"].

Lobatiriccardia

*** *L. coronopus* (De Not. ex Steph.) Furuki OV: **Campbell 1971** as *Riccardia lobata*, Miller et al. 1983 as *Riccardia lobata* var. *lobata*. VI: **Gibbs 1909** as *Aneura lobata*, **Campbell 1971** as *Riccardia lobata*, Miller et al. 1983 as *Riccardia lobata* var. *lobata*.

Lopholejeunea

*** *L. eulopha* (Taylor) Schiffn. FIJ: **Mitten 1862** as *Lejeunea eulopha*, **1873** as *Phragmicoma eulopha*, Stephani 1912 as *Lopholejeunea immersa*, Verdoorn 1934, Miller et al. 1983 as *Lopholejeunea immersa*, Sass-Gyarmati 2008. KA: **Pócs et al.**

2011. TA: **Pócs et al. 2011.** VI: **Campbell 1971**, Miller et al. 1983, **Hürlimann 1991.**

*** *L. hispidissima* Steph. TA: **Pócs et al. 2011.** VI: **Pócs et al. 2011.**

*** *L. nigricans* (Lindenb.) Schiffn. FIJ: Stephani 1912 as *Lopholejeunea multiflora*, Sass-Gyarmati 2008. KA: **Pócs et al. 2011.** OV: **TYPE** of *Lopholejeunea multiflora*, **Jack & Stephani 1894** as *Lopholejeunea multiflora*, Miller et al. 1983 as *Lopholejeunea multiflora*, **Geissler & Bischler 1985** as *Lopholejeunea multiflora*, **Zhu & Gradstein 2005.** TA: **Pócs et al. 2011.** VI: **Campbell 1971** as *Lopholejeunea multiflora*, Miller et al. 1983 as *Lopholejeunea multiflora.*

** *L. pocsii* Gyarmati FIJ: Sass-Gyarmati 2008. VI: **TYPE, Sass-Gyarmati 2005.**

** *L. renistipula* (Mitt.) Steph. FIJ: **TYPE** of *Phragmicoma renistipula*, **Mitten 1873** as *Phragmicoma renistipula*, Stephani 1912, **Thiers 1983** as *Phragmicoma renistipula*, Miller et al. 1983 also as *Phragmicoma renistipula*, Geissler & Bischler 1985, **1989** as *Phragmicoma renistipula.*

*** *L. subfusca* (Nees) Schiffn. FIJ: Sass-Gyarmati 2008. KA: **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VA: **Campbell 1971**, Miller et al. 1983. VI: **Campbell 1971**, Miller et al. 1983, **Hürlimann 1991.**

** *L. vojtkoana* Gyarmati FIJ: von Konrat et al. 2010b. KA: **TYPE, Sass-Gyarmati 2008.** TA: **Sass-Gyarmati 2008.**

*** *L. zollingeri* (Steph.) Schiffn. FIJ: Sass-Gyarmati 2005, 2008, Haerida et al. 2010. VA: **Zhu & Gradstein 2005.**

Marchantia

*** *M. vitiensis* Steph. FIJ: **TYPE, SYNTYPE** of *Marchantia samoana* Steph., **Stephani 1899a,** also as *Marchantia samoana*, Grolle 1968 as *Marchantia samoana*, **Geissler & Bischler 1985** as *Marchantia samoana.* OV: **Geissler & Bischler 1985, Bischler-Causse 1989.** VA: **Campbell 1971,** Miller et al. 1983, **Bischler-Causse 1989.** VI: **Gibbs 1909, Hürlimann 1960, 1976** both as *Marchantia samoana*, **Campbell 1971**, Miller et al. 1983 also as *Marchantia samoana*, **Bischler-Causse 1989.**

Mastigolejeunea

*** *M. auriculata* (Wilson) Schiffn. FIJ: Verdoorn 1934 as *Mastigolejeunea humilis*, Miller et al. 1983 as *Mastigolejeunea guahamensis.* OV: **Jack & Stephani 1894** as *Mastigolejeunea guahamensis*, Miller et al. 1983 as *Mastigolejeunea humilis.*

*** *M. calcarata* (Mitt. ex Steph.) Verd. FIJ: Stephani 1911 as *Archilejeunea calcarata*, Verdoorn 1934, Bonner 1962b as *Archilejeunea calcarata*, **Thiers 1983** as *Phragmicoma calcarata*, Geissler & Bischler 1985, Hürlimann 1989, Sass-Gyarmati 2003. KA: **Pócs et al. 2011.** OV: **TYPE** of *Phragmicoma calcarata*, **Mitten 1873** as *Phragmicoma calcarata*, Miller et al. 1983 also as *Archilejeunea calcarata* and *Phragmicoma calcarata*, **Thiers 1985, Geissler & Bischler 1989** as *Phragmicoma calcarata*, **Thiers & Gradstein 1989,Pócs et al. 2011.** VI: **Campbell 1971**, Miller et al. 1983.

Mastigophora

*** *M. diclados* (Brid. ex F.Weber) Nees FIJ: Miller et al. 1983 as *Mastigophora angustisecta.* OV: **Jack & Stephani 1894, Campbell 1971**, Miller et al. 1983. TA: **Campbell 1971**, Miller et al. 1983. VA: **TYPE of** *Mastigophora angustisecta*,

Herzog 1951b as *Mastigophora angustisecta*, Miller et al. 1983, **Geissler & Bischler 1985** as *Mastigophora angustisecta*. VI: **Campbell 1971, Hürlimann 1983,** Miller et al. 1983.

Metalejeunea

** *M. crassitexta* (J.B.Jack et Steph.) Pócs FIJ: Schuster 1963 as *Lejeunea crassitexta*, Miller et al. 1983 as *Lejeunea crassitexta*, Geissler & Bischler 1987 as *Lejeunea crassitexta*. KA: **Pócs et al. 2011.** OV: **TYPE** of *Microlejeunea crassitexta*, **Jack & Stephani 1894** as *Microlejeunea crassitexta*, Stephani 1915 as *Microlejeunea crassitexta*, **Miller et al. 1963b,** 1983 both as *Microlejeunea crassitexta*, **Campbell 1971** as *Microlejeunea crassitexta*, **Geissler & Bischler 1985** as *Microlejeunea crassitexta*, **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Campbell 1971** as *Microlejeunea crassitexta*, Miller et al. 1983 as *Microlejeunea crassitexta*, Pócs et al. 2011.

*** *M. cucullata* (Reinw., Blume et Nees) Grolle FIJ: Bischler et al. 1962 as *Microlejeunea cucullata*., Miller et al. 1963a as *Microlejeunea cucullata*, Inoue & Miller 1965 as *Microlejeunea cucullata*, Pócs et al. 1967 as *Microlejeunea cucullata*, Mizutani 1978a as *Lejeunea cucullata*. KA: **Pócs et al. 2011.** OV: **Jack & Stephani 1894** as *Microlejeunea albicans*, **Miller et al. 1963b,** 1983 both as *Microlejeunea cucullata*. VI: **Campbell 1971** as *Microlejeunea cucullata*, Miller et al. 1983 as *Microlejeunea cucullata*, **Hürlimann 1993** as *Lejeunea cucullata*.

Metzgeria

***[14] *M. ciliata* Raddi FIJ: Piippo 1991 as *Metzgeria decipiens*, Kuwahara 1984, 1985 both as *Metzgeria decipieus*, Koponen et al. 2000 as *Metzgeria decipiens*, Costa 2008. OV: **Campbell 1971** as *Metzgeria decipiens*, Miller et al. 1983 as *Metzgeria decipiens*. VI: **Hürlimann 1969** as *Metzgeria decipieus*, **Campbell 1971** as *Metzgeria decipiens*, Miller et al. 1983 as *Metzgeria decipiens*.

*** *M. furcata* (L.) Corda FIJ: **Mitten 1873, Kuwahara 1966,** 1985 both as *Metzgeria densiseta*. OV: **Jack & Stephani 1894,** Miller et al. 1983 [with a "?"]. TA: **Pócs et al. 2011.** VI: **Gibbs 1909, Campbell 1971** as *Metzgeria densiseta*, Miller et al. 1983 also as *Metzgeria densiseta* Steph.

*** *M. leptoneura* Spruce FIJ: **SYNTYPE** of *Metzgeria papulosa*, **Stephani 1899d** as *Metzgeria papulosa*, **Kuwahara 1961,** 1966, 1968, 1969 all as *Metzgeria parvipapulosa*, 1982, 1984 both as *Metzgeria papulosa*, 1985 also as *M. papulosa*, Engel 1976, Miller et al. 1983 as *Metzgeria parvipapulosa*, Schuster 1992a as *Metzgeria parvipapulosa*, Damsholt 2002. VI: **Kuwahara 1966** as *Metzgeria hamata*, **Campbell 1971** as *Metzgeria hamata*, Miller et al. 1983, **Piippo 1991.**

** — var. *leptoneura* FIJ: Schuster 1992a. VI: **Campbell 1971** as *Metzgeria hamata*.

** *M. lindbergii* Schiffn. FIJ: **Kuwahara 1961** as *Metzgeria oceanica*, 1965, **1966,** 1968 all as *Metzgeria pectinata*, 1985 as *Metzgeria minor*, Miller et al. 1983 as *Metzgeria pectinata* and *Metzgeria oceanica*.

[14] *Metzgeria ciliata* was (as *M. decipiens*) treated as a synonym of *M. furcata* by Grolle (2002b) but accepted by Costa (2008). Some reports of *M. furcata* may belong here.

Microlejeunea

** *M. lunulatiloba* Horik. VI: **Pócs et al. 2011.**

Mnioloma

** *M. novaezelandiae* J.J.Engel VI: **Pócs et al. 2011.**

Notoscyphus

*** *N. lutescens* (Lehm. et Lindenb.) Mitt. VI: **Schuster 2002.**

Pallavicinia

*** *P. lyellii* (Hook.) Carruth. FIJ: **Stephani 1900**, Bonner 1965 as *Diplomitrion lyellii*, Miller et al. 1983, Schuster 1992a.

Phaeolejeunea

*** *P. amicorum* (Hürl.) Pócs FIJ: **Wilson et al. 2007.** KA: **Pócs 2008a**, Pócs et al. 2011. TA: **Pócs 2008a**, Pócs et al. 2011. VI: **Pócs et al. 2011.**

** *P. inermis* (Steph.) Mizut. KA: **Pócs et al. 2011.**

Plagiochila

*** *P abietina* (Nees) Nees et Mont. FIJ: Bonner 1962a, Miller et al. 1983, Inoue 1986, Piippo 1989a. VI: **Hürlimann 1974, Inoue 1984.**

*** *P. arbuscula* (Brid. ex Lehm. et Lindenb.) Lindenb. FIJ: **Mitten 1861, Mitten 1873,** Stephani 1903b as *Plagiochila belangeriana*, **Herzog 1938** as *Plagiochila heterospina*, **Bonner 1962a** as *Plagiochila heterospina*, Miller et al. 1983 as *Plagiochila heterospina*, **Geissler & Bischler 1989** as *Plagiochila heterospina*, Nair et al. 2005. OV: **Jack & Stephani 1894** as *Plagiochila belangeriana*, **Campbell 1971** as *Plagiochila belangeriana* var. *heterospina*, Miller et al. 1983, **So 2000.** TA: **HOLOTYPE** of *Plagiochila heterospina*, **Campbell 1971** as *Plagiochila belangeriana* var. *heterospina*, Miller et al. 1983, **Inoue 1984.** VA: **Campbell 1971** as *Plagiochila belangeriana* var. *heterospina*, Miller et al. 1983, **Inoue 1984.** VI: **Campbell 1971** as *Plagiochila belangeriana* var. *heterospina*, **Hürlimann 1974** as *Plagiochila alta*, Miller et al. 1983, **So 2000, 2001a, b.**

*** *P. bantamensis* (Reinw., Blume et Nees) Mont. FIJ: Piippo 1989a as *Plagiochila parvisaccata*. VI: **Campbell 1971** as *Plagiochila auriculata*, Miller et al. 1983 as *Plagiochila auriculata*, **So & Grolle 2000, So 2001a.**

** *P. bicornuta* Steph. TA: **Pócs et al. 2011.**

** *P. chauviniana* Mont. FIJ: **Stephani 1904a** as *Plagiochila longispica*, Miller et al. 1983 as *Plagiochila longispica*.

** *P. fissidentoides* Taylor FIJ: **Stephani 1903a** ["*fissidentoidea*"]. OV: **Campbell 1971** ["*fissidentoidea*"], Miller et al. 1983. TA: **Campbell 1971** ["*fissidentoidea*"], Miller et al. 1983. VI: **Campbell 1971** ["*fissidentoidea*"], Miller et al. 1983.

*** *P. hampeana* Gottsche FIJ: Piippo 1989a, So & Grolle 1999, So & Grolle 2001. VI: **Inoue 1970, Hürlimann 1974,** Miller et al. 1983, **Inoue 1984.**

** *P. huerlimannii* Inoue FIJ: Inoue 1972c. VI: **TYPE, Inoue 1970, Hürlimann 1974,** Miller et al. 1983, **Geissler & Bischler 1989, Grolle & So 1999, So 2001b.**

*** *P. javanica* (Sw.) Nees et Mont. VI: **Gibbs 1909** as *Plagiochila powellii*, Miller et al. 1983 as *Plagiochila powellii*.

*** *P. sandei* Dozy ex Sande Lac. FIJ: **TYPE** of *Plagiochila seemannii* and its var. *perspinosa*, **Mitten 1861, 1873** both as *Plagiochila seemannii*, **Stephani 1904a** as *Plagiochila seemannii*, **Herzog 1938** as *Plagiochila seemannii* var. *perspinosa*, **Bonner 1962a** as *Plagiochila seemannii* and its var. *perspinosa*, **Thiers 1983** as *Plagiochila seemannii*, Miller et al. 1983 as *Plagiochila seemannii* var. *perspinosa*, **Geissler & Bischler 1989** as *Plagiochila seemannii* and its var. *perspinosa*, Piippo 1989a as *Plagiochila seemannii*, **So & Grolle 1999, So 2001b.** OV: **Campbell 1971** as *Plagiochila seemannii*, Miller et al. 1983 as *Plagiochila seemannii*. TA: **Campbell 1971** as *Plagiochila seemannii*, Miller et al. 1983 as *Plagiochila seemannii*. VA: **Grolle 1968** as *Plagiochila seemannii*, Miller et al. 1983 as *Plagiochila seemannii*. VI: **Campbell 1971** as *Plagiochila seemannii*, **Hürlimann 1974** as *Plagiochila seemannii*, Miller et al. 1983 as *Plagiochila seemannii*.

*** *P. teysmannii* Sande Lac. OV: **TYPE** of *Plagiochila ovalava*, **Stephani 1903c** as *Plagiochila ovalava*, **Bonner 1962a** as *Plagiochila ovalava*, Miller et al. 1983 as *Plagiochila ovalava*, **Geissler & Bischler 1989** as *Plagiochila ovalava*, **So 2001b.**

** *P. vitiensis* Mitt. FIJ: **Mitten 1873, Stephani 1903a** as *Plagiochila tahitensis*, **Bonner 1962a**, **Inoue 1981**, Miller et al. 1983 as *Plagiochila brotheri*, Inoue 1986, **Geissler & Bischler 1989.** VI: **TYPE** and **TYPE** of *Plagiochila blepharophora* ε *vitilevuana*, **Mitten 1861, Schiffner 1890** as *Plagiochila blepharophora* ε *vitilevuana*, **Bonner 1962a** as *Plagiochila blepharophora* ε *vitilevuana*, **Inoue 1970, Hürlimann 1974, Thiers 1983**, Miller et al. 1983 also as *Plagiochila tahitensis* [with a "?"] and *Plagiochila blepharophora* var. *vitilevuana*, Scott & Bradshaw 1985, **Geissler & Bischler 1989** as *Plagiochila blepharophora* ε *vitilevuana*, **So 2001b.**

Plagiochilion

*** *P. braunianum* (Nees) S.Hatt. VI: **Hürlimann 1974** ["*braunianus*"], Miller et al. 1983.

*** *P. oppositum* (Reinw., Blume et Nees) S.Hatt. FIJ: **TYPE** of *Plagiochila geminifolia*, **Mitten 1873** as *Plagiochila geminifolia*, Stephani 1897 as *Plagiochila geminifolia*, **1904b** as *Plagiochila opposita*, Schiffner 1898, 1900 both as *Plagiochila opposita*, Inoue 1958 as *Noguchia opposita*, 1982, Bonner 1962a as *Plagiochila geminifolia*, **Thiers 1983** as *Plagiochila geminifolia*, Miller et al. 1983 as *Plagiochila geminifolia*, **Geissler & Bischler 1989** as *Plagiochila geminifolia*, **So 2001b.** OV: **Jack & Stephani 1894** as *Plagiochila geminifolia*, Miller et al. 1983. VI: **Pócs et al. 2011.**

Pleurozia

*** *P. conchifolia* (Hook. et Arn.) Austin

** — var. *conchifolia* TA: **Pócs et al. 2011.**

*** *P. gigantea* (F.Weber) Lindb. OV: **Jack & Stephani 1894** as *Physiotium giganteum*, Miller et al. 1983 also as *Physiotium giganteum*, **Thiers 1993.** TA: **Thiers 1993.** VI: **Gibbs 1909, Campbell 1971**, Miller et al. 1983, **Thiers 1993.**

Plicanthus

*** [15] *P. birmensis* (Steph.) R.M.Schust. VI: **Campbell 1971** as *Chandonanthus birmensis*, Miller et al. 1983 as *Chandonanthus birmensis*.

*** *P. hirtellus* (F.Weber) R.M.Schust. FIJ: Schuster 1963 as *Chandonanthus hirtellus*, Váňa & Piippo 1989b as *Chandonanthus hirtellus*. VI: Miller et al. 1983 as *Chandonanthus hirtellus* [Viti Levu with a "?"].

Porella

*** [16] *P. elegantula* (Mont.) E.A.Hodgs. FIJ: **Mitten 1873** as *Madotheca stangeri*, Miller et al. 1983 as *Madotheca stangeri* and *Porella stangeri*. OV: **Campbell 1971**, Miller et al. 1983. VI: **Campbell 1971**, Miller et al. 1983.

** *P. viridissima* (Mitt.) Grolle FIJ: Stephani 1910 as *Madotheca viridissima*, Hattori 1975a as *Porella viridissima* var. *viridissima*. OV: Miller et al. 1983 as *Porella viridissima* var. *viridissima*, **So 2002.** VI: **Campbell 1971** as *Porella hebridensis*, **Hattori 1975d**, Miller et al. 1983 as *Porella viridissima* var. *viridissima* and *Porella hebridensis*, **Hattori 1985, 1986c, Hürlimann 1989, So 2002.**

Psiloclada

*** *P. clandestina* Mitt. FIJ: Piippo 1984b, Pócs 1984. VA: **Schuster 1970, Schuster 1963.** VI: **Schuster 1970, Campbell 1971.**

** — subsp. *melanesica* R.M.Schust. FIJ: Schuster 2000. VI: **Schuster 1980a**, Miller et al. 1983.

Ptychanthus

*** *P. striatus* (Lehm. et Lindenb.) Nees FIJ: **Mitten 1873** as *Bryopteris striata*. LA: **Verdoorn 1937.** TA: **Pócs et al. 2011.** VI: **Gibbs 1909, Campbell 1971, Hürlimann 1989.**

** — var. *striatus* OV: Miller et al. 1983. VI: Miller et al. 1983.

Pycnolejeunea

* [17] *P. convexifolia* (Mitt.) Steph. FIJ: **TYPE** of *Lejeunea convexifolia*, **Mitten 1873** as *Lejeunea convexifolia*, Stephani 1897 as *Pycnolejeunea convexistipa*, 1914, Miller et al. 1983 also as *Pycnolejeunea convexistipa* and *Lejeunea convexifolia*, **Geissler & Bischler 1987** as *Lejeunea convexifolia*. VI: **He 1999.**

[15] *Plicanthus birmensis* seems to be close to *Tetralophozia* (N. Konstantinova, pers. comm. 2009).

[16] Preliminary investigation of New Zealand material suggests that *Porella elegantula* is a complex of three forms. The type of *P. elegantula* is from Auckland Islands, and appears to be more or less confined to western and southern South Island, and the subantartics, and seems to be endemic to New Zealand. The record here is thus doubtful and needs clarification.

[17] *Pycnolejeunea convexifolia* may be a form of *Cheilolejeunea trapezia* (X.-L.He, pers. comm.).

Radula

* [18] *R. acuminata* Steph. FIJ: Yamada & Piippo 1989, Zhu & So 2001, So 2006. TA: **Pócs et al. 2011.** VI: **Yamada 1984.**

** *R. acuta* Mitt. TA: **So 2006.**

*** *R. amentulosa* Mitt. FIJ: **TYPE, Mitten 1873,** Stephani 1910, Herzog 1953, Kitagawa 1973b, Yamada 1975, 1979, **Thiers 1983,** Miller et al. 1983, Yamada 1985, **1999, Yamada & Piippo 1989, Geissler & Bischler 1990.** OV: **So 2006.** TA: **So 2006.** VA: **So 2006.** VI: **Mitten 1861, Yamada 1984, So 2006.**

*** *R. campanigera* Mont. OV: **Campbell 1971,** Miller et al. 1983. TA: **Campbell 1971,** Miller et al. 1983. VI: **Campbell 1971,** Miller et al. 1983.

*** *R. decurrens* Mitt. OV: **Castle 1965.**

*** *R. formosa* (C.F.W.Meissn. ex Spreng.) Nees FIJ: **TYPE** of *Radula spicata*, **Mitten 1862, 1873** both as *Radula spicata*, Stephani 1910, **Castle 1950,** Inoue & Miller 1965, Grolle 1966, Kitagawa 1979, Yamada 1979, **1999, Thiers 1983** as *Radula spicata*, Miller et al. 1983 as *Radula spicata*, **Yamada & Piippo 1989, Geissler & Bischler 1990** as *Radula spicata*, **So 2006.** KA: **So 2006.** VA: **Campbell 1971,** Miller et al. 1983. VI: **Hürlimann 1978,** Miller et al. 1983, **So 2006.**

*** *R. javanica* Gottsche OV: **Castle 1966.** TA: **So 2006.** VI: **So 2006.**

*** *R. lingulata* Gottsche FIJ: So 2006. VI: **Yamada 1984.**

* [19] *R. multiflora* Gottsche ex Schiffn. KA: **Pócs et al. 2011.** TA: **Pócs et al. 2011.** VI: **Yamada 1984.**

* [20] *R. nymanii* Steph. FIJ: Yamada 1979, Miller et al. 1983, Yamada & Piippo 1989. TA: **current report.** VI: **current report.**

*** *R. protensa* Lindenb. TA: **Pócs et al. 2011.**

** — var. *erectilobula* Schiffn. VI: **Campbell 1971** ["*errectilobula*"], Miller et al. 1983.

*** *R. reflexa* Nees et Mont. TA: **So 2006.** VI: **So 2006.**

*** *R. retroflexa* Taylor TA: **So 2006.** VA: **Campbell 1971** as *Radula miqueliana*, Miller et al. 1983 as *Radula retroflexa* var. *retroflexa*. VI: **Campbell 1971** as *Radula miqueliana*, Miller et al. 1983 as *Radula retroflexa* var. *retroflexa*.

*** *R. scariosa* Mitt. FIJ: **TYPE, Mitten 1873,** Stephani 1910, **Castle 1950, Thiers 1983,** Miller et al. 1983, Yamada 1985 as *Radula scariosa* var. *scariosa*, **1999, Geissler & Bischler 1990.** VI: **Mitten 1861, So 2006.**

*** *R. tjibodensis* K.I.Goebel FIJ: Zhu & So 2001, Eggers & Pócs 2010. TA: **Campbell 1971,** Miller et al. 1983. VI: **Campbell 1971, Hürlimann 1978,** Miller et al. 1983, **So 2006.**

[18] *Radula acuminata* is very close to *R. tjibodensis* (Söderström et al. 2010).

[19] *Radula multiflora* was treated as a new synonym of *Radula javanica* by So (2006), but accepted by Renner and de Lange (2009), who record this species as new for New Zealand, where *R. javanica* also occurs.

[20] *Radula nymanii* is close to *R. protensa* (Söderström et al. 2010). We have not found any first hand report of it from Fiji in the literature although Yamada (1979) reports it but we are able to cite the following specimens: Taveuni, Wainibau Stream, leg. *S & T Pócs 03826/AR*; road to De Voeux Peak, leg. *S. & T. Pócs 03288/DP*; Viti Levu, South Coast, *S & T Pócs 03261/CA*, all det. M. Renner, 2011.

Riccardia

*** *R. alba* (Colenso) E.A.Br. FIJ: Miller et al. 1983 as *Riccardia vitiensis*, Geissler & Bischler 1990 as *Riccardia vitiensis*. OV: **TYPE** of *Aneura samoana* and *Aneura vitiensis*, **Stephani 1893a** as *Aneura vitiensis* and *Aneura samoana* ["Samoa-Ovalau"], **1899c** as *Aneura vitiensis*, **Jack & Stephani 1894** as *Aneura vitiensis*, **Bonner 1962b** as *Aneura vitiensis*, **Campbell 1971** as *Riccardia vitiensis*, Miller et al. 1983 as *Riccardia samoana*, *Aneura samoana* and *Aneura vitiensis*, **Brown & Braggins 1989**. VA: **Campbell 1971** as *Riccardia vitiensis*, Miller et al. 1983 as *Riccardia samoana*. VI: **Campbell 1971** as *Riccardia vitiensis*, **Hürlimann 1976** as *Riccardia samoana*, Miller et al. 1983 as *Riccardia samoana*.

** *R. flagellaris* (A.Gepp) H.A.Mill. FIJ: Schuster 1992a as *Aneura flagellaris*. VI: **TYPE** of *Aneura flagellaris*, **Gibbs 1909** as *Aneura flagellaris*, **Bonner 1977** as *Aneura flagellaris*, Miller et al. 1983 also as *Aneura flagellaris*.

*** *R. graeffei* (Steph.) Hewson FIJ: Geissler & Bischler 1990, Furuki 2002, Furuki 2006. VI: **TYPE** of *Aneura graeffei*, **Stephani 1893a** as *Aneura graeffei*, **Jack & Stephani 1894** as *Aneura graeffei*, **Bonner 1962b** as *Aneura graeffei*, **Hürlimann 1976**, Miller et al. 1983 also as *Aneura graeffei*, **Furuki 1991**.

** *R. heteroclada* Schiffn. TA: **Campbell 1971** as *Riccardia serrulata*, Miller et al. 1983 as *Riccardia serrulata*.

** *R. nadeaudii* (Steph.) Hürl. VI: **Gibbs 1909** as *Aneura nadeaudii*, Miller et al. 1983.

** *R. pectinata* (Steph.) Hürl. var. *fasciculata* FIJ: Miller et al. 1983 as *Riccardia fasciculata*. VI: **Hürlimann 1976**, Miller et al. 1983.

** *R. plumosa* (Mitt.) E.O.Campb. FIJ: **TYPE** of *Sarcomitrium plumosum*, **Mitten 1862, 1873** both as *Sarcomitrium plumosum*, **Stephani 1899b** as *Aneura plumosa*, Bonner 1962b as *Aneura plumosa*, **Thiers 1983** as *Sarcomitrium plumosum*, Miller et al. 1983 as *Sarcomitrium plumosum* and *Aneura plumosa*, **Geissler & Bischler 1990** also as *Sarcomitrium plumosum*. VI: **Campbell 1971, Hürlimann 1976**, Miller et al. 1983.

** *R. tenuicostata* Schiffn. VI: **Gibbs 1909** as *Aneura tenuicostata*, Miller et al. 1983.

Riccia

** *R. linearis* (Schiffn.) Steph. FIJ: **Stephani 1898**, Geissler & Bischler 1990. VI: **TYPE** of *Ricciella linearis*, **Schiffner 1890** as *Ricciella linearis*, Miller et al. 1983, **Geissler & Bischler 1990** as *Ricciella linearis*.

** *R. rechingeri* Steph. VI: **Campbell 1971**, Miller et al. 1983.

Saccogynidium

** *S. chiloscyphoides* R.M.Schust. VA: **TYPE, Schuster 1963**, Miller et al. 1983, **Geissler & Bischler 1990**.

** *S. muricellum* (De Not.) Grolle FIJ: **Grolle & Schultze-Motel 1973**, Miller et al. 1983, Piippo 1985, Hürlimann 1998, Gao et al. 2001.

** *S. rigidulum* (Nees) Grolle FIJ: Grolle 1965, 1968 both also as *Saccogynidium jugatum*, **Grolle & Schultze-Motel 1973**, Miller et al. 1983 as *Saccogynidium jugatum*, Piippo 1985, Gao et al. 2001. VA: Miller et al. 1983.

Sandeothallus

** *S. radiculosus* (Schiffn.) R.M.Schust. VI: **Campbell 1971** as *Calycularia radiculosa*, Miller et al. 1983 as *Moerckia radiculosa*.

Schistochila

*** *S. aligera* (Nees et Blume) J.B.Jack et Steph. FIJ: Miller et al. 1983 as *Paraschistochila graeffeana*, Geissler & Bischler 1989 as *Paraschistochila graeffeana*, 1990 as *Schistochilaster graeffeanus*. OV: **TYPE** of *Schistochila graeffeana*, **Jack & Stephani 1894** as *Schistochila graeffeana*, Stephani 1909 as *Schistochila graeffeana*, Miller et al. 1983 as *Schistochilaster graeffeanus* and *Schistochila graeffeana*, **Geissler & Bischler 1990** as *Schistochila graeffeana*. VA: **Campbell 1971** as *Schistochila philippinensis*, Miller et al. 1983 as *Schistochilaster philippinensis*. VI: **Campbell 1971** as *Schistochila philippinensis*, Miller et al. 1983 as *Schistochilaster philippinensis*.

*** *S. blumei* (Nees) Trevis. VI: **Hürlimann 1998.**

*** *S. caledonica* Steph. FIJ: Hürlimann 1998. VI: **Campbell 1971** as *Schistochila flavicans*, Miller et al. 1983.

*** *S. fijiensis* H.Buch et Herzog TA: **Campbell 1971**, Miller et al. 1983. VA: **TYPE**, **Herzog 1951a**, **Campbell 1971**, Miller et al. 1983, **Geissler & Bischler 1990.** VI: **Campbell 1971**, Miller et al. 1983.

*** *S. repleta* (Hook.f. et Taylor) Steph. VI: **Gibbs 1909** as *Schistochila heterodonta*, Miller et al. 1983 as *Schistochila heterodonta*.

*** *S. sciurea* (Nees) Schiffn. FIJ: Schiffner 1898. OV: **Jack & Stephani 1894**, **Campbell 1971**, Miller et al. 1983 also as *Ptilidium sciureum* and *Schistocheila sciurea*. VI: Miller et al. 1983 as *Gottschea sciurea* and *Jungermannia sciurea*, **Hürlimann 1998**.

Solenostoma

*** *S. ariadne* (Taylor ex Lehm.) R.M.Schust. ex Váňa et D.G.Long FIJ: Váňa 1973a, 1975, 1991a all as *Jungermannia ariadne*, Váňa & Piippo 1989a as *Jungermannia ariadne*, Bapna & Kachroo 2000 as *Jungermannia ariadne*, Schuster 2002 as *Solenostoma ariadne*. VA: **Váňa 1973b** as *Jungermannia ariadne*, Miller et al. 1983 as *Plectocolea ariadne*. VI: **Váňa 1973b** as *Jungermannia ariadne*, Miller et al. 1983 as *Plectocolea ariadne*.

*** *S. haskarlianum* (Nees) R.M.Schust. ex Váňa et D.G.Long FIJ: Váňa 1973a, 1991a both as *Jungermannia haskarliana*, Váňa & Inoue 1983 as *Jungermannia haskarliana*, Váňa & Piippo 1989a as *Jungermannia haskarliana*, Bapna & Kachroo 2000 as *Jungermannia haskarliana*, Gao & Bai 2001 as *Jungermannia haskarliana*, Schuster 2002 as *Solenostoma hasskarlianum*. VA: **Campbell 1971** as *Plectocolea haskarliana*. VI: **Campbell 1971** as *Plectocolea haskarliana*, **Váňa 1973b**, 1975 both as *Jungermannia haskarliana*, **Hürlimann 1974** as *Jungermannia haskarliana* ["*hasskarliana*"], Miller et al. 1983 as *Jungermannia haskarliana*.

*** *S. tetragonum* (Lindenb.) R.M.Schust. ex Váňa et D.G.Long FIJ: Váňa & Piippo 1989a as *Jungermannia tetragona*, Váňa 1991a as *Jungermannia tetragona*, Schuster 2002 as *Solenostoma tetragonum*, Váňa et al. 2005 as *Jungermannia tetragona*. TA: **Campbell 1971** as *Plectocolea tetragona*, **Váňa 1975** as *Jungermannia tetragona*, Miller et al. 1983 as *Jungermannia tetragona*. VA: **Campbell 1971** as *Plectocolea tetragona*, Miller et al. 1983 as *Jungermannia tetragona*. VI: **Campbell 1971** as *Plectocolea tetragona*, Miller et al. 1983 as *Jungermannia tetragona*.

*** *S. truncatum* (Nees) R.M.Schust. ex Váňa et D.G.Long FIJ: Váňa 1991a as *Jungermannia truncata*, Piippo et al. 1998 as *Jungermannia truncata*, Váňa et al. 2005 as *Jungermannia truncata*. VI: **Váňa & Piippo 1989a** as *Jungermannia truncata*.

Spruceanthus

*** *S. polymorphus* (Sande Lac.) Verd. KA: **Pócs et al. 2011**. OV: **Campbell 1971**, Miller et al. 1983. VI: **Campbell 1971**, Miller et al. 1983.

Symphyogynopsis

*** *S. gottscheana* (Mont. et Nees) Grolle FIJ: Furuki 2002 as *Symphyogynopsis filicum*, Chantanaorrapint et al. 2004 as *Symphyogynopsis filicum*. OV: **TYPE** of *Symphyogyna vitiensis*, **Jack & Stephani 1894** as *Symphyogyna vitiensis*, **Stephani 1900** as *Symphyogyna vitiensis*, Miller et al. 1983 as *Symphyogyna vitiensis*, **Grolle & Piippo 1986** as *Symphyogynopsis filicum*, **Geissler & Bischler 1990** as *Symphyogyna vitiensis*. VI: **Gibbs 1909** as *Symphyogyna vitiensis*, **Hürlimann 1969** as *Symphyogyna vitiensis*, **Campbell 1971** as *Symphyogyna vitiensis*, Miller et al. 1983 as *Symphyogyna vitiensis*, **Grolle & Piippo 1986** as *Symphyogynopsis filicum*.

Taxilejeunea

** *T. deflexa* Steph. FIJ: **TYPE**, Stephani 1914, Eifrig 1937, **Geissler & Bischler 1990**. VI: Miller et al. 1983.

Telaranea

*** *T. lindenbergii* (Gottsche) J.J.Engel et G.L.Merr. VI: **Gibbs 1909** as *Lepidozia lindenbergii*.

*** *T. pruinosa* (Herzog) J.J.Engel et G.L.Merr. OV: **TYPE** of *Lepidozia pruinosa*, **Herzog 1951a** as *Lepidozia pruinosa*, Miller et al. 1983 as *Lepidozia pruinosa*, **Geissler & Bischler 1985** as *Lepidozia pruinosa*, **Engel & Smith Merrill 2004**.

*** *T. rosarioana* H.A.Mill. FIJ: Engel & Smith Merrill 2004 [the locality is in Vanuatu, not in Fiji]. VI: **Pócs et al. 2011**.

Temnoma

*** *T. setigerum* (Lindenb.) R.M.Schust. FIJ: Schuster 1969, Piippo 1984a, Schuster 1984, Long & Grolle 1990, Bapna & Kachroo 2000, Schuster 2000. VI: **Schuster 1968**.

** [21] — var. *hawaiicum* Inoue FIJ: Miller et al. 1983.

** — var. *setigerum* (Lindenb.) R.M.Schust. VI: Miller et al. 1983.

Thysananthus

*** *T. retusus* (Reinw., Blume et Nees) B.M.Thiers et Gradst. FIJ: **Mitten 1873** as *Phragmicoma plana*, Schiffner 1898 as *Thysananthus planus*, Miller et al. 1983 as

[21] *Temnoma setigerum* is reported from Fiji both as var. *setigerum* and var. *hawaiicum* by Miller et al. (1983), but we are not aware of any first hand report of any of the varieties and do not know what they are basing their reports on.

Phragmicoma plana. VA: **Verdoorn 1937** as *Thysananthus planus*, **Campbell 1971** as *Thysananthus planus*, Miller et al. 1983 as *Thysananthus planus*. VI: **Campbell 1971** as *Caudalejeunea stephanii*, Miller et al. 1983 as *Thysananthus planus*, **Hürlimann 1989** as *Thysananthus planus*.

*** *T. spathulistipus* (Reinw., Blume et Nees) Lindenb. KA: **Pócs et al. 2011**. OV: **Jack & Stephani 1894** as *Thysanolejeunea spathulistipa*, **Campbell 1971**, Miller et al. 1983. VI: **Campbell 1971**, **Hürlimann 1989**.

Treubia

** *T. insignis* (Steph.) R.M.Schust. et G.A.M.Scott. FIJ: Piippo 1988.

** — subsp. *bracteata* (Steph.) R.M.Schust. et G.A.M.Scott FIJ: Schuster 1963 as *Treubia bracteata*. TA: **Campbell 1971** as *Treubia bracteata*, Miller et al. 1983. VI: **Gibbs 1909** as *Treubia bracteata*, Miller et al. 1983.

** — subsp. *vitiensis* R.M.Schust. et G.A.M.Scott FIJ: Schuster & Konstantinova 1995. VI: **TYPE, Schuster & Scott 1969**, Miller et al. 1983, **Geissler & Bischler 1990**.

*** *T. lacunosa* (Colenso) Prosk. VI: **Gibbs 1909** as *Treubia bracteata*.

Trichocolea

* [22] *T. pluma* (Reinw., Blume et Nees) Mont. FIJ: Grolle 1965, Kitagawa 1973b, Kitagawa 1978. OV: **Jack & Stephani 1894**, Miller et al. 1983. TA: **Campbell 1971**. VA: **Campbell 1971**. VI: **Gibbs 1909**, **Campbell 1971**, **Hürlimann 1983**, Miller et al. 1983.

*** *T. tomentella* (Ehrh.) Dumort. FIJ: **Mitten 1861**.

Zoopsidella

*** *Z. caledonica* (Steph.) R.M.Schust. FIJ: Schuster 1969, Grolle & Piippo 1984, Schuster 2000. VI: Schuster 1970, **Schuster 1999**.

Zoopsis

** *Z. liukiuensis* Horik. VA: **Pócs et al. 2011**. VI: **Pócs et al. 2011**.

Taxa doubtfully occurring on Fiji

List of taxa reported from Fiji that we regard questionable and in need of verification either from re-examination of specimens or new reports.

Frullania

* [23] *F. brotheri* Steph. FIJ: Stephani 1911, Bonner 1965. VI: Miller et al. 1983 [Viti Levu with a "?"].

[22] *Trichocolea pluma* is almost inseparable from *T. tomentella* and often included in the latter (Söderström et al. 2010).

[23] We know of no first hand report of *Frullania brotheri* from Fiji. Furthermore, it is taxonomically questionable and possibly just a form of *F. nodulosa* (Söderström et al. 2010).

** [24] *F. hamata* Steph. FIJ: Pócs 2008b. VI: **Campbell 1971**, Miller et al. 1983.

***[25] *F. hypoleuca* Nees FIJ: von Konrat & Braggins 2001, Pócs 2008b. OV: Miller et al. 1983.

Heteroscyphus

** [26] *H. caledonicus* (Steph.) Schiffn. FIJ: Miller et al. 1983, Hürlimann 1998.

** [27] *H. parvulus* (Schiffn.) Schiffn. VI: **Gibbs 1909** as *Chiloscyphus parvulus.*

Lejeunea

** [28] *L. papilionacea* Steph. Fij: Bonner 1966 as *Hygrolejeunea diversitexta.*

Schiffneriolejeunea

***[29] *S. tumida* (Gottsche) Gradst. et Terken var. *haskarliana* VA: Miller et al. 1983 as *Schiffneriolejeunea haskarliana.* VI: Miller et al. 1983 as *Schiffneriolejeunea haskarliana.*

Telaranea

***[30] *T. wallichiana* (Gottsche) R.M.Schust. VI: **Campbell 1971** as *Lepidozia tenera,* Miller et al. 1983 as *Lepidozia tenera.*

[24] *Frullania hamata* is given as endemic to New Guinea by Hattori & Piippo (1986) without commenting on the records from Fiji. We treat the report from Fiji as doubtful until the identity of the specimen is confirmed.

[25] We know of no first hand report of *Frullania hypoleuca* from Fiji and we do not know what Miller et al. (1983) are basing their report on. However, they include taxa in their synonym list that we refer elsewhere and it may be some of these, but *F. hypoleuca* may well occur in Fiji since it occurs on other islands in the Pacific.

[26] We know of no first hand reports of *Heteroscyphus caledonicus* and none of the references Miller et al. (1983) cite seem to mention it for Fiji.

[27] *Heteroscyphus parvulus* occurs only in Java, Borneo and New Guinea according to Piippo (1992). We treat the report from Fiji as doubtful unit the identity of the specimen confirmed.

[28] The only report of *Lejeunea papilionaceae* from the Pacific is a second hand report by Bonner (1966) from Fiji and New Caledonia. It is a taxon from Africa and SE Asia.

[29] We know of no first hand reports of *Schiffneriolejeunea tumida* from Fiji and do not know what Miller et al. (1983) are basing their reports on. However, it is widely distributed in the Pacific so it probably also occurs in Fiji.

[30] *Telaranea wallichiana* is a species complex that was treated by Engel & Smith Merrill (2004), but they do not report it from anywhere in the Pacific although earlier reports exist.

Taxa rejected from Fiji

List of taxa reported from Fiji that has been shown erroneous or are here rejected.

Cheilolejeunea

*** [31] *C. mariana* (Gottsche) B.M.Thiers et Gradst. FIJ: Stephani 1911 as *Archilejeunea mariana*. VA: **Campbell 1971** as *Archilejeunea mariana*, Miller et al. 1983 as *Spruceanthus marianus*. VI: **Campbell 1971** as *Archilejeunea mariana*, Miller et al. 1983 as *Spruceanthus marianus*.

Frullania

*** [32] *F. orientalis* Sande Lac. VI: **Campbell 1971**, Miller et al. 1983.

Hygrolejeunea

* [33] *H. parvicalycina* Steph. FIJ: Bonner 1966, Miller et al. 1983.

Lejeunea

** [34] *L. tenella* Taylor VI: **Campbell 1971** as *Euosmolejeunea tenella*, Miller et al. 1983 as *Euosmolejeunea tenella*.

Lepicolea

*** [35] *L. scolopendra* (Hook.) Dumort. ex Trevis. FIJ: Fulford 1963, Hässel & Solari 1975, Miller et al. 1983, Solari 1983, Schuster 2000.

Lepidolaena

** [36] *L. brachyclada* (Taylor ex Lehm.) Trevis. FIJ: Miller et al. 1983 [with a "?"].

Leptolejeunea

** [37] *L. lancifolia* (Mitt.) Steph. FIJ: Miller et al. 1983 [with a "?"].

[31] Thiers & Gradstein (1989) showed that most of the reports of *Cheilolejeunea mariana* belongs to *Archilejeunea planiuscula*. *C. mariana* is confined to the Mariana Is. and Caroline Is.

[32] All reports of *Frullania orientalis* from Fiji are *Frullania capillaris* (Hattori 1985).

[33] The genus *Hygrolejeunea* is a now generally regarded as a synonym of *Lejeunea* but *H. parvicalycina* has never been transferred and we do not know the value of it. Furthermore, we know of no first hand report and can not find what Bonner (1965) is basing his report on. It is otherwise confined to Java.

[34] *Lejeunea tenella* is rejected from the Pacific by Zhu (2006).

[35] *Lepicolea scolopendra* is a taxon from Australia and New Zealand erronously reported from many parts of the world.

[36] *Lepidolaena brachyclada* is endemic to Tasmania (Schuster 1984).

[37] *Leptolejeunea lancifolia* is reported from Fiji by Miller et al. (1983) probably because it was published in *Flora Vitiensis* by Mitten (1873), but he clearly states that it is from Samoa. Mitten reported many new things from areas other than Fiji in that publication, and several authors have been too uncritical and reported many taxa from Fiji that never have been found there, because of this unfortunate way of publishing.

Lopholejeunea

*** [38] *L. plicatiscypha* (Hook.f. et Taylor) Steph. FIJ: Stephani 1912 as *Lopholejeunea tecta*, Miller et al. 1983 [with a "?"], Thiers & Gradstein 1989.

Marchantia

*** [39] *M. chenopoda* L. VI: **Schiffner 1890**, Miller et al. 1983 [with a "?"], Bischler-Causse 1989.

** [40] *M. paleacea* Bertol. FIJ: **Mitten 1873** [s.loc.spec.], Evans 1917 [with doubt], Hattori 1966 [with a "?"], Hattori 1968 [with a "?"], Bapna & Kachroo 2000b. OV: Miller et al. 1983 [with a "?"]. VI: Miller et al. 1983 [with a "?"].

*** — subsp. *paleacea* FIJ: Schiffner 1898 as *Marchantia nitida*, Miller et al. 1983 as *Marchantia nitida*, Schuster 1992b [with a "?"]. OV: **Jack & Stephani 1894** as *Marchantia nitida*. VI: **Mitten 1873** as *Marchantia nitida*.

*** [41] *M. pileata* Mitt. FIJ: **Mitten 1862**, Miller et al. 1983.

Mastigolejeunea

*** [42] *M. virens* (Ångstr.) Steph. FIJ: Miller et al. 1983 as *Mastigolejeunea taitica*.

Metzgeria

*** [43] *M. procera* Mitt. VI: **Kuwahara 1966** as *Metzgeria hamata*, **Campbell 1971** as *Metzgeria hamata*.

Plagiochila

*** [44] *P. blepharophora* (Nees) Lindenb. FIJ: Miller et al. 1983.

Plagiochilion

** [45] *P. combinatum* (Mitt.) Inoue FIJ: Stephani 1904b as *Plagiochila combinata*, Miller et al. 1983 also as *Plagiochila combinata* [both with a "?"].

[38] *Lopholejeunea plicatiscypha* is reported from Fiji by Stephani (1912; as *Lopholejeunea tecta*) probably because it was published in *Flora Vitiensis* by Mitten (1873), but there he clearly states that it is from Kermadec. Mitten reported many new things from areas other than Fiji in that publication, and several authors have been too uncritical and reported many taxa from Fiji that never have been found there, because of this unfortunate way of publishing.

[39] *Marchantia chenopoda* is an American species (Bischler-Causse 1989).

[40] All reports of *Marchantia paleacea* refer to *M. vitiensis* (Bischler-Causse 1989).

[41] All reports of *Marchantia pileata* refer to *M. vitiensis* (Bischler-Causse 1989).

[42] *Mastigolejeunea virens* is reported from Fiji based on complicated synonymy. We know of no reliable report although it occurs on many islands in the South Pacific.

[43] *Metzgeria procera* is an American species erroneously reported from many parts of the world due to complicated synonymy.

[44] *Plagiochila blepharophora* is reported due to erronous synonymy with *P. vitiensis*.

Porella

** [46] *P. javanica* (Gottsche ex Steph.) Inoue VI: **Campbell 1971**, Miller et al. 1983.

Psiloclada

** [47] *P. clandestina* Mitt. subsp. *clandestina* Mitt. VA: Miller et al. 1983. VI: Miller et al. 1983.

Radula

** [48] *R. anceps* Sande Lac. FIJ: So 2006. VI: Campbell 1971, Miller et al. 1983 as *Radula anceps* var. *anceps*.

*** [49] *R. brunnea* Steph. FIJ: Miller et al. 1983.

*** [50] *R. complanata* (L.) Dumort. OV: Miller et al. 1983.

Riccardia

*** [51] *R. chamedryfolia* (With.) Grolle VI: **Schiffner 1890** as *Aneura pinnatifida*.

Symbiezidium

*** [52] *S. transversale* (Sw.) Trevis. var. *transversale* FIJ: Verdoorn 1934 as *Symbiezidium bacciferum*, Miller et al. 1983 as *Symbiezidium bacciferum*.

Telaranea

*** [53] *T. bisetula* (Steph.) E.O.Campb. FIJ: Engel & Smith Merrill 2004. VI: **Campbell 1971**, Miller et al. 1983 also as *Lepidozia bisetula*.

*** [54] *T. melanesica* H.A.Mill. FIJ: Engel & Smith Merrill 2004.

*** [55] *T. tetradactyla* (Hook.f. et Taylor) E.A.Hodgs. VI: **Váňa 1975** as *Jungermannia tetradactyla*, Miller et al. 1983, **Hürlimann 1985**, Engel & Smith Merrill 2004.

[45] We know of no reliable report of *Plagiochilion combiantum* outside Hawaii.

[46] Hattori (1985) doubted the report of *Porella javanica* from Fiji but did not study any specimen and So (2002) rejected it after seeing the specimens the report was based on.

[47] All reports of *Psiloclada clandestina* from Fiji should be referred to subsp. *melanesica*.

[48] *Radula anceps* was rejected from Fiji by So (2006).

[49] Kitagawa (1973b) rejected earlier reports of *Radula brunnea* from Fiji as a result of the erronous synonymization with *R. amentulosa* by Castle (1950).

[50] *Radula complanata* is a boreal taxon that almost certainly does not occur in Fiji. We have not found the source for the report in Miller et al. (1983).

[51] *Riccardia chamedryfolia* is a boreal species not occurring in Fiji.

[52] *Symbiezidium transversale* is an American species (Gradstein & van Beek 1975).

[53] The report of *Telaranea bisetula* by Campbell (1971) is rejected by Hürlimann (1985).

[54] The locality for *Telaranea melanesica* is in Vanuatu, not in Fiji.

[55] Engel & Smith Merrill (2004) reject all earlier reports of *Telaranea tetradactyla* from Fiji.

Treubia

** [56] *T. insignis* K.I.Goebel subsp. *insignis* VI: Miller et al. 1983.

Tylimanthus

*** [57] *T. saccatus* (Hook.) Mitt. ex Carrington et Pearson FIJ: Mitten 1873 as *Marsupidium urvilleanum*, Miller et al. 1983 as *Tylimanthus urvilleanus* [with a "?"], *Gymnanthe urvilleana* and *Marsupidium urvilleanum*.

Synonyms

Only synonyms used in reports from Fiji are included.

Anastrophyllum contractum (Reinw., Blume et Nees) Steph. ≡ *Cuspidatula contracta*

Anastrophyllum graeffei J.B.Jack et Steph. = *Denotarisia linguifolia*

Anastrophyllum vitiense J.B.Jack et Steph. = *Cuspidatula contracta*

Aneura flagellaris A.Gepp ≡ *Riccardia flagellaris*

Aneura graeffei Steph. ≡ *Riccardia graeffei*

Aneura lobata (Schiffn.) Steph. = *Lobatiriccardia coronopus*

Aneura nadeaudii Steph. ≡ *Riccardia nadeaudii*

Aneura pinnatifida (Weber) Nees = *Riccardia chamedryfolia*

Aneura plumosa (Mitt.) Steph. ≡ *Riccardia plumosa*

Aneura samoana Steph. = *Riccardia alba*

Aneura tenuicostata (Schiffn.) Steph. ≡ *Riccardia tenuicostata*

Aneura vitiensis Steph. = *Riccardia alba*

Anthoceros amboinensis Schiffn. ≡ *Folioceros amboinensis*

Anthoceros appendiculatus Steph. = *Folioceros glandulosus*

Anthoceros flagellaris Mitt. ≡ *Megaceros flagellaris*

Anthoceros fuciformis Mont. ≡ *Folioceros fuciformis*

Anthoceros glandulosus Lehm. et Lindenb. ≡ *Folioceros glandulosus*

Anthoceros laevis subsp. *carolinianus* (Michx.) Prosk. ≡ *Phaeoceros carolinianus*

Archilejeunea calcarata (Mont.) Mitt. ex Steph. = *Mastigolejeunea calcarata*

Archilejeunea graeffei J.B.Jack et Steph. ≡ *Lepidolejeunea graeffei*

Archilejeunea mariana (Gottsche) Steph. ≡ *Cheilolejeunea mariana*

Archilejeunea meyeniana (Nees, Lindenb. et Gottsche) J.B.Jack et Steph. ≡ *Cheilolejeunea meyeniana*

[56] *Treubia insignis* subsp. *insignis* is a SE Asiatic taxon and only subsp. *bracteata* and *vitiensis* occurs in Fiji.

[57] All reports of *Tylimanthus saccatus* originate from Mitten (1871) where he reports it as *Marsupidium urvilleanum* saying "A single stem picked from amongst Mosses is all that indicates the presence of this or some closely allied species". We reject the report due to this vague statement, and the fact that the species is not reported from anywhere else in the Pacific.

Aspiromitus glandulosus (Lehm. et Lindenb.) Steph. ≡ *Folioceros glandulosus*
Bazzania australis (Mont.) Trevis. = *Bazzania tridens*
Bazzania australis Gottsche, Lindenb. et Nees = *Bazzania tridens*
Bazzania vitiensis Mitt. ex E.O.Campb. *nom. inval.* = *Bazzania vitiana*
Bryopteris sinclairii (Mitt.) Mitt. ≡ *Lejeunea sinclairii*
Bryopteris striata (Lehm. et Lindenb.) Mitt. ≡ *Ptychanthus striatus*
Calycularia radiculosa Steph. ex Schiffn. *nom. illeg.* = *Sandeothallus radiculosus*
Caudalejeunea recurvistipula (Gottsche) Schiffn. = *Caudalejeunea reniloba*
Caudalejeunea stephanii Spruce ex Steph. = *Thysananthus retusus*
Chandonanthus birmensis Steph. ≡ *Plicanthus birmensis*
Chandonanthus hirtellus (F.Weber) Mitt. ≡ *Plicanthus hirtellus*
Cheilolejeunea parkinsonii (Steph.) Mizut. = *Cheilolejeunea cookiensis*
Chiloscyphus argutus (Reinw., Blume et Nees) Nees ≡ *Heteroscyphus argutus*
Chiloscyphus aselliformis (Reinw., Blume et Nees) Nees ≡ *Heteroscyphus aselliformis*
Chiloscyphus communis Steph. = *Heteroscyphus coalitus*
Chiloscyphus confluens Mitt. = *Heteroscyphus aselliformis*
Chiloscyphus endlicherianus (Nees) Nees = *Heteroscyphus argutus* var. *argutus*
Chiloscyphus parvulus Schiffn. ≡ *Heteroscyphus parvulus*
Chiloscyphus succulentus Gottsche ≡ *Heteroscyphus succulentus*
Cololejeunea goebelii (Gottsche ex Schiffn.) Schiffn. = *Cololejeunea trichomanis*
Cololejeunea hispidissima (Steph.) Pandé, K.P.Srivast. et Sultan Khan = *Cololejeunea haskarliana* var. *haskarliana*
Cololejeunea nymannii (Steph.) Benedix = *Cololejeunea obliqua*
Cololejeunea vitiensis (E.O.Campb.) H.A.Mill. *nom. illeg.* = *Cololejeunea polyantha*
Colura acutifolia Ast = *Colura conica*
Colura apiculata Schiffn. ex Steph. = *Colura leratii*
Colurolejeunea apiculata Schiffn. *nom. inval.* = *Colura leratii*
Crossogyna flexicaulis (Nees) Schljakov ≡ *Jamesoniella flexicaulis*
Cuspidatula vitiensis (J.B.Jack et Steph.) Steph. = *Cuspidatula contracta*
Dendroceros pusillus Steph. = *Dendroceros javanicus*
Dendrolejeunea vittata (Mitt.) Steph. ex Schiffn. *nom. illeg.* = *Dendrolejeunea fruticosa*
Diplasiolejeunea brachyclada A.Evans = *Diplasiolejeunea cavifolia*
Diplomitrion lyellii (Hook.) Corda ≡ *Pallavicinia lyellii*
Drepanolejeunea filicuspis Steph. ≡ *Harpalejeunea filicuspis*
Drepanolejeunea riddleana Steph. = *Harpalejeunea filicuspis*
Drepanolejeunea ternatensis var. *lancispina* Herzog = *Drepanolejeunea ternatensis*
Drepanolejeunea uncinata (Mitt.) Steph. = *Drepanolejeunea ternatensis*
Dumortiera trichocephala (Hook.) Nees = *Dumortiera hirsuta* subsp. *nepalensis*
Dumortiera velutina Schiffn. = *Dumortiera hirsuta* subsp. *nepalensis*
Enosmolejeunea parkinsonii Steph. = *Cheilolejeunea cookiensis*
Enosmolejeunea partiicola (Reichardt) J.B.Jack et Steph. = *Cheilolejeunea trifaria*

Euosmolejeunea tenella (Taylor) Steph. ≡ *Lejeunea tenella*
Euosmolejeunea trifaria (Reinw., Blume et Nees) Spruce ex Schiffn. ≡ *Cheilolejeunea trifaria*
Euosmolejeunea uvifera (Mont.) Steph. = *Lejeunea flava*
Folioceros spinisporus (Steph.) D.C.Bharadwaj = *Folioceros amboinensis*
Frullania angulistipa (Steph.) Steph. *nom. inval.* ≡ *Frullania angustistipa*
Frullania angulosa Mitt. = *Frullania intermedia* subsp. *intermedia*
Frullania curvatirostra J.B.Jack ex Steph. *nom. inval.* = *Frullania novocurvirostris*
Frullania curvirostris J.B.Jack et Steph. *nom. illeg.* ≡ *Frullania novocurvirostris*
Frullania grossispica Steph. = *Frullania serrata*
Frullania inflatistipula J.B.Jack ex Bonner *nom. inval.* = *Frullania nodulosa*
Frullania intermedia f. *billardieriana* (Nees et Mont.) Verd. = *Frullania intermedia* subsp. *intermedia*
Frullania kluedingiana Steph. = *Frullania intermedia* subsp. *intermedia*
Frullania meteoroides Mitt. = *Frullania serrata*
Frullania pacificae Taylor = *Frullania apiculata*
Frullania parhamii (R.M.Schust.) R.M.Schust. *nom. inval.* ≡ *Frullania parhamii*
Frullania pendula Austin *nom. illeg.* = *Frullania deflexa*
Frullania rechingeri Steph. = *Frullania immersa*
Frullania squarrosa (Nees) Nees = *Frullania ericoides*
Frullania stellatitexta Steph. = *Frullania intermedia* subsp. *intermedia*
Frullania varians J.B.Jack ex Bonner *nom. inval.* = *Frullania deflexa*
Frullania vesiculosa Steph. = *Frullania ericoides*
Frullania vethii Sande Lac. = *Frullania trichodes*
Gottschea sciurea (Nees) Sande Lac. ≡ *Schistochila sciurea*
Gymnanthe urvilleana (Mont.) Taylor = *Tylimanthus saccatus*
Harpalejeunea owaihiensis (Gottsche) A.Evans = *Lepidolejeunea involuta*
Herbertus tutuilanus Pearson = *Herbertus longifissus*
Herpetium australe Mont. = *Bazzania tridens*
Heteroscyphus communis (Steph.) Schiffn. = *Heteroscyphus coalitus*
Heteroscyphus concinnus (De Not.) Schiffn. = *Heteroscyphus succulentus*
Heteroscyphus confluens (Mitt.) Schiffn. = *Heteroscyphus aselliformis*
Hygrolejeunea decurvifolia Steph. = *Lepidolejeunea bidentula*
Hygrolejeunea devexiloba Steph. = *Lepidolejeunea integristipula*
Hygrolejeunea graeffeana Steph. = *Lejeunea lumbricoides*
Hygrolejeunea procumbens (Mitt.) Steph. ≡ *Lejeunea procumbens*
Jamesoniella contracta (Reinw., Blume et Nees) N.Kitag. ≡ *Cuspidatula contracta*
Jamesoniella ovifolia (Schiffn.) Schiffn. = *Denotarisia lingnifolia*
Jungermannia ariadne Taylor ex Lehm. ≡ *Solenostoma ariadne*
Jungermannia flexicaulis Nees ≡ *Jamesoniella flexicaulis*
Jungermannia haskarliana (Nees) Mitt. ≡ *Solenostoma haskarlianum*
Jungermannia sciurea Nees ≡ *Schistochila sciurea*

Jungermannia tetradactyla Hook.f. et Taylor ≡ *Telaranea tetradactyla*

Jungermannia tetragona Lindenb. ≡ *Solenostoma tetragonum*

Jungermannia truncata Nees ≡ *Solenostoma truncatum*

Kurzia bisetula (Steph.) Grolle ≡ *Telaranea bisetula*

Lejeunea apiculata Schiffn. *nom. inval.* = *Colura leratii*

Lejeunea caespitosa Lindenb. = *Lejeunea capensis*

Lejeunea convexifolia Mitt. ≡ *Pycnolejeunea convexifolia*

Lejeunea crassitexta (J.B.Jack et Steph.) R.M.Schust. ≡ *Metalejeunea crassitexta*

Lejeunea cucullata (Reinw., Blume et Nees) Nees *nom. illeg.* ≡ *Metalejeunea cucullata*

Lejeunea cucullata (Reinw., Blume et Nees) Nees ≡ *Metalejeunea cucullata*

Lejeunea eulopha Taylor ≡ *Lopholejeunea eulopha*

Lejeunea graeffei J.B.Jack et Steph. ex P.Geissler et Bischl. *nom. inval.* = *Lepidolejeunea graeffei*

Lejeunea hawaiiensis Gottsche ex Mitt. = *Lepidolejeunea involuta*

Lejeunea integristipula (Mizut.) J.B.Jack et Steph. ex P.Geissler et Bischl. *nom. inval.* = *Lepidolejeunea integristipula*

Lejeunea meyeniana Nees, Lindenb. et Gottsche ≡ *Cheilolejeunea meyeniana*

Lejeunea polyantha Mitt. *nom. illeg.* = *Cololejeunea polyantha*

Lejeunea polyrhiza auct. *nom. illeg.* = *Leptolejeunea epiphylla*

Lejeunea superba Mont. ≡ *Colura superba*

Lejeunea superba var. *apiculata* Schiffn. *nom. inval.* = *Colura leratii*

Lejeunea tripuncta Mitt. ≡ *Leptolejeunea tripuncta*

Lejeunea uvifera Mont. = *Lejeunea flava*

Lepicolea loriana Steph. = *Lepicolea rara*

Lepidozia bisetula Steph. ≡ *Telaranea bisetula*

Lepidozia lindenbergii Gottsche ≡ *Telaranea lindenbergii*

Lepidozia pruinosa Herzog ≡ *Telaranea pruinosa*

Lepidozia tenera Steph. = *Telaranea wallichiana*

Leptocolea goebelii (Gottsche ex Schiffn.) A.Evans = *Cololejeunea trichomanis*

Leptocolea vitiensis (Mitt.) E.O.Campb. *nom. illeg.* = *Cololejeunea polyantha*

Leptolejeunea radiata (Mitt.) Steph. = *Leptolejeunea maculata*

Leptolejeunea rhombifolia Steph. = *Leptolejeunea maculata*

Leptolejeunea schiffneri (Steph. ex Schiffn.) Steph. = *Leptolejeunea maculata*

Leptolejeunea schiffneri (Steph.) Steph. *nom. inval.* = *Leptolejeunea maculata*

Leptolejeunea subacuta Steph. ex A.Evans = *Leptolejeunea elliptica*

Lophocolea graeffei J.B.Jack et Steph. ≡ *Heteroscyphus graeffei*

Lophocolea muricata (Lehm.) Nees ≡ *Chiloscyphus muricatus*

Lophocolea parva Steph. ≡ *Chiloscyphus parvus*

Lophocolea rectangulata Mitt. ≡ *Chiloscyphus samoanus*

Lopholejeunea contractilis (Mitt.) Steph. = *Caudalejeunea recurvistipula*

Lopholejeunea immersa (Mitt.) Steph. = *Lopholejeunea eulopha*

Lopholejeunea multiflora J.B.Jack et Steph. = *Lopholejeunea nigricans*

Lopholejeunea tecta (Mitt.) Steph. = *Lopholejeunea plicatiscypha*
Madotheca stangeri Lindenb. et Gottsche = *Porella elegantula*
Madotheca viridissima Mitt. ex Steph. = *Porella viridissima*
Marchantia nitida Lehm. et Lindenb. = *Marchantia paleacea* subsp. *paleacea*
Marchantia samoana Steph. = *Marchantia vitiensis*
Marsupidium urvilleanum (Mont.) Mitt. = *Tylimanthus saccatus*
Mastigobryum australe (Mont.) Lindenb. = *Bazzania tridens*
Mastigobryum caudistipulum Steph. ≡ *Bazzania caudistipula*
Mastigobryum combinatum J.B.Jack et Steph. ≡ *Bazzania coubinata*
Mastigobryum hamatifolium Steph. ≡ *Bazzania hamatifolia*
Mastigobryum paradoxum Sande Lac. ≡ *Bazzania paradoxa*
Mastigobryum uncigerum (Reinw., Blume et Nees) Nees ≡ *Bazzania uncigera*
Mastigobryum vitiense Mitt. ex Steph. = *Bazzania vitiana*
Mastigolejeunea guahameusis (Lindenb.) Steph. = *Mastigolejeunea auriculata*
Mastigolejeunea humilis (Gottsche) Schiffn. = *Mastigolejeunea auriculata*
Mastigolejeunea taitica (Gottsche ex Steph.) Gottsche ex Steph. = *Mastigolejeunea virens*
Mastigophora angustisecta Herzog = *Mastigophora diclados*
Megaceros monospirus Steph. = *Megaceros flagellaris*
Metzgeria decipiens (C.Massal.) Schiffn. = *Metzgeria ciliata*
Metzgeria densiseta Steph. = *Metzgeria furcata*
Metzgeria hamata (Mitt.) Lindb. *nom. illeg.* ≡ *Metzgeria procera*
Metzgeria minor (Schiffn.) Kuwah. = *Metzgeria lindbergii*
Metzgeria oceanica Kuwah. = *Metzgeria lindbergii*
Metzgeria papulosa Steph. = *Metzgeria leptoneura*
Metzgeria parvipapulosa Kuwah. = *Metzgeria leptoneura*
Metzgeria pectinata Steph. = *Metzgeria lindbergii*
Metzgeriopsis pusilla K.I.Goebel = *Cololejeunea metzgeriopsis*
Microlejeunea albicans (Nees) Steph. = *Metalejeunea cucullata*
Microlejeunea crassitexta J.B.Jack et Steph. ≡ *Metalejeunea crassitexta*
Microlejeunea cucullata (Reinw., Blume et Nees) J.B.Jack et Steph. ≡ *Metalejeunea cucullata*
Microlejeunea samoana Steph. = *Lejeunea patersonii*
Moerckia radiculosa Schiffn. ≡ *Sandeothallus radiculosus*
Neohattoria parhamii R.M.Schust. ≡ *Frullania parhamii*
Noguchia opposita (Reinw., Blume et Nees) Inoue ≡ *Plagiochilion oppositum*
Paraschistochila graeffeana (J.B.Jack et Steph.) R.M.Schust. = *Schistochila aligera*
Phaeoceros laevis subsp. *carolinianus* (Michx.) Prosk. ≡ *Phaeoceros carolinianus*
Phragmicoma bilabiata Mitt. ≡ *Archilejeunea bilabiata*
Phragmicoma calcarata (Mont.) Mitt. *nom. illeg.* = *Mastigolejeunea calcarata*
Phragmicoma contractilis Mitt. = *Caudalejeunea recurvistipula*
Phragmicoma eulopha (Taylor) Mitt. ≡ *Lopholejeunea eulopha*
Phragmicoma plana (Sande Lac.) Mitt. = *Thysananthus retusus*

Phragmicoma renistipula Mitt. ≡ *Lopholejeunea renistipula*
Physiotium giganteum (F.Weber) Lindb. ≡ *Pleurozia gigantea*
Physocolea polyantha (Mitt.) Steph. = *Cololejeunea polyantha*
Plagiochila alta Steph. = *Plagiochila arbuscula*
Plagiochila auriculata Mitt. = *Plagiochila bantamensis*
Plagiochila belangeriana Lindenb. = *Plagiochila arbuscula*
Plagiochila belangeriana var. *heterospina* (Steph. ex Herzog) E.O.Campb. = *Plagiochila arbuscula*
Plagiochila blepharophora ≡ *vitilevuana* Schiffn. = *Plagiochila vitiensis*
Plagiochila brotheri Steph. = *Plagiochila vitiensis*
Plagiochila combinata Mitt. ≡ *Plagiochilion combinatum*
Plagiochila dendroides (Nees) Lindenb. ≡ *Chiastocaulon dendroides*
Plagiochila geminifolia Mitt. = *Plagiochilion oppositum*
Plagiochila heterospina Steph. ex Herzog *nom. illeg.* = *Plagiochila arbuscula*
Plagiochila longispica Mitt. = *Plagiochila chauviniana*
Plagiochila opposita (Reinw., Blume et Nees) Lindenb. ≡ *Plagiochilion oppositum*
Plagiochila ovalava Steph. = *P. teysmannii*
Plagiochila parvisacculata Steph. = *Plagiochila bantamensis*
Plagiochila powellii Mitt. ex Steph. = *Plagiochila javanica*
Plagiochila seemannii Mitt. = *Plagiochila sandei*
Plagiochila seemannii var. *perspinosa* Herzog = *Plagiochila sandei*
Plagiochila tahitensis Ångstr. = *Plagiochila vitiensis*
Plectocolea ariadne (Taylor ex Lehm.) Mitt. ≡ *Solenostoma ariadne*
Plectocolea haskarliana (Nees) Mitt. ≡ *Solenostoma haskarlianum*
Plectocolea tetragona (Lindenb.) Amakawa ≡ *Solenostoma tetragonum*
Porella hebridensis (Steph.) E.O.Campb. = *Porella viridissima*
Porella stangeri (Lindenb. et Gottsche) Trevis. = *Porella elegantula*
Ptilidium sciureum (Nees) Nees ≡ *Schistochila sciurea*
Ptychocoleus pycnocladus (Taylor) Steph. ≡ *Acrolejeunea pycnoclada*
Pycnolejeunea bidentula (Steph.) Steph. *nom. inval.* ≡ *Lepidolejeunea bidentula*
Pycnolejeunea bidentula Steph. ≡ *Lepidolejeunea bidentula*
Pycnolejeunea ceylanica (Gottsche) Schiffn. ≡ *Cheilolejeunea ceylanica*
Pycnolejeunea convexistipa (Mitt.) Steph. *nom. illeg.* ≡ *Pycnolejeunea convexifolia*
Pycnolejeunea decurvifolia (Steph.) Steph. = *Lepidolejeunea bidentula*
Pycnolejeunea falsinervis (Sande Lac.) Schiffn. ≡ *Cheilolejeunea falsinervis*
Pycnolejeunea graeffei (J.B.Jack et Steph.) Horik. ≡ *Lepidolejeunea graeffei*
Pycnolejeunea graeffei (J.B.Jack et Steph.) Verd. *nom. inval.* ≡ *Lepidolejeunea graeffei*
Pycnolejeunea integristipula J.B.Jack et Steph. ≡ *Lepidolejeunea integristipula*
Pycnolejeunea meyeniana (Nees, Lindenb. et Gottsche) Steph. ≡ *Cheilolejeunea meyeniana*
Pycnolejeunea setifera Steph. = *Cheilolejeunea gardneri*
Pycnolejeunea trapezia (Nees) Schiffn. ≡ *Cheilolejeunea trapezia*

Radula miqueliana Taylor = *Radula retroflexa*
Radula spicata Mitt. = *Radula formosa*
Riccardia fasciculata (Steph.) Steph. *nom. illeg.* ≡ *Riccardia pectinata* var. *fasciculata*
Riccardia lobata Schiffn. = *Lobatiriccardia coronopus*
Riccardia maxima Schiffn. ≡ *Aneura maxima*
Riccardia samoana (Steph.) H.A.Mill. = *Riccardia alba*
Riccardia serrulata Schiffn. = *Riccardia heteroclada*
Riccardia vitiensis (Steph.) E.O.Campb. = *Riccardia alba*
Ricciella linearis Schiffn. ≡ *Riccia linearis*
Saccogynidium jugatum (Mitt.) Grolle = *Saccogynidium rigidulum*
Sarcomitrium plumosum Mitt. ≡ *Riccardia plumosa*
Schiffneriolejeunea haskarliana (Gottsche) Gradst. ≡ *Schiffneriolejeunea tumida* var. *haskarliana*
Schistochila flavicans Steph. = *Schistochila caledonica*
Schistochila graeffeana J.B.Jack et Steph. = *Schistochila aligera*
Schistochila heterodonta (Colenso) Steph. = *Schistochila repleta*
Schistochila philippinensis (Mont.) Steph. = *Schistochila aligera*
Schistochilaster graeffeanus (J.B.Jack et Steph.) H.A.Mill. = *Schistochila aligera*
Schistochilaster philippinensis (Mont.) H.A.Mill. = *Schistochila aligera*
Schusterella parhamii (R.M.Schust.) S.Hatt., Sharp et Mizut. ≡ *Frullania parhamii*
Solenostoma hasskarlianum (Nees) R.M.Schust. *nom. inval.* ≡ *Solenostoma haskarlianum*
Spruceanthus marianus (Gottsche) Mizut. ≡ *Cheilolejeunea mariana*
Symbiezidium bacciferum (Taylor) Steph. = *Symbiezidium transversale* var. *transversale*
Symbiezidium integristipulum (J.B.Jack et Steph.) Steph. ≡ *Lepidolejeunea integristipula*
Symphyogyna vitiensis J.B.Jack et Steph. = *Symphyogynopsis gottscheana*
Symphyogynopsis filicum (Nadeaud) Grolle = *Symphyogynopsis gottscheana*
Taxilejeunea cuculliflora Steph. ≡ *Lejeunea cuculliflora*
Taxilejeunea gracilipes (Taylor) Steph. ≡ *Lejeunea gracilipes*
Taxilejeunea lumbricoides (Nees) Schiffn. ≡ *Lejeunea lumbricoides*
Taxilejeunea umbilicata (Nees) J.B.Jack et Steph. ≡ *Lejeunea umbilicata*
Thysananthus fruticosus (Lindenb. et Gottsche) Schiffn. ≡ *Dendrolejeunea fruticosa*
Thysananthus planus Sande Lac. = *Thysananthus retusus*
Thysananthus sinclairii (Mitt.) Steph. ≡ *Lejeunea sinclairii*
Thysanolejeunea fruticosa (Lindenb. et Gottsche) Steph. ≡ *Dendrolejeunea fruticosa*
Thysanolejeunea spathulistipa (Reinw., Blume et Nees) Steph. ≡ *Thysananthus spathulistipus*
Treubia bracteata Steph. = *Treubia lacunosa*
Treubia bracteata Steph. ≡ *Treubia insignis* subsp. *bracteata*
Tylimanthus urvilleanus (Mont.) Hässel et Solari = *Tylimanthus saccatus*

Acknowledgments

The financial assistance of the National Geographic Committee for Research and Exploration (Grant No. 8247-07) and Global Biological Information Facility (GBIF) Seed Money Award No. 2007/41 is gratefully acknowledged. We wish to also thank the Biodiversity Synthesis Center (BioSynC) at The Field Museum — a component of the Encyclopedia of Life (*EOL*) — which sponsored an international liverwort meeting and workshop that contributed to this checklist. The authors gratefully acknowledge the valuable assistance, guidance, and logistical support provided by the Suva Herbarium, and especially Marika Tuiwawa and Alifereti Naikatini.

References

Arnell S (1958) Hepatics from Tristan da Cunha. *Results of the Norwegian Scientific Expedition to Tristan da Cunha, 1937-1938* 42: 1–76.

Austin CF (1872) New Hepaticae. *Bulletin of the Torrey Botanical Club* 3: 9–18.

Bai X-L (2002) Frullaniaceae flora of Yunnan, China. *Chenia* 7: 1–27.

Bapna KR & Kachroo P (2000) *Hepaticology of India I.* (Himanshu Publications: Udaipur).

Bapna KR & Kachroo P (2000b) *Hepaticology of India II.* (Himanshu Publications: Udaipur).

Bischler H, Miller HA & Bonner CEB (1961) [1962] Studies in Lejeuneaceae III. A historical account of *Lejeunea cucullata* (Reinwardt, Blume & Nees) Nees and its varieties. *Nova Hedwigia* 3: 445–462.

Bischler-Causse H (1989) *Marchantia* L. The Asiatic and Oceanic taxa. *Bryophytorum Bibliotheca* 38: 1–317.

Bizot M & Pócs T (1974) East African Bryophytes I. *Egri tanárképzö föiskola tudományos közleményei. Acta Academiae Paedagogicae Agriensis* 12: 383–449.

Bonner CEB (1962a) *Index Hepaticarum. Pars I.* Plagiochila *(Dum.) Dum.* (J. Cramer: Weinheim).

Bonner CEB (1962b) *Index Hepaticarum. Pars II.* Achiton *to* Balantiopsis. (J. Cramer: Weinheim).

Bonner CEB (1963a) *Index Hepaticarum. Pars III.* Barbilophozia *to* Ceranthus. (J. Cramer: Weinheim).

Bonner CEB (1963b) *Index Hepaticarum. Pars IV.* Ceratolejeunea *to* Cystolejeunea. (J. Cramer: Weinheim).

Bonner CEB (1965) *Index Hepaticarum. Pars V.* Delavayella *to* Geothallus. (J. Cramer: Weinheim).

Bonner CEB (1966) *Index Hepaticarum. Pars VI.* Goebeliella *to* Jubula. (J. Cramer: Weinheim).

Bonner CEB (1977) *Index Hepaticarum. Pars VIIa. Supplementum A-C.* (J. Cramer: Vaduz).

Brown EA & Braggins JE (1989) A revision of the genus *Riccardia* S. F. Gray in New Zealand with notes on the genus *Aneura* Dum. *Journal of the Hattori Botanical Laboratory* 66: 1–132.

Campbell EO (1971) Liverworts collected in Fiji by A. C. Smith and W. Greenwood. *Journal of the Royal Society of New Zealand* 1: 7–30.

Castle H (1950) A revision of the genus *Radula.* Part II. Subgenus *Acroradula.* Section 2. *Amentulosae. The Bryologist* 53: 253–275.

Castle H (1965) A revision of the genus *Radula.* Part II. Subgenus *Acroradula.* Section 9. *Densifoliae. Revue Bryologique et Lichénologique* 33: 328–398.

Castle H (1966) A revision of the genus *Radula.* Part II. Subgenus *Acroradula.* Section 10. *Ampliatae. Revue Bryologique et Lichénologique* 34: 1–81.

Chantanaorrapint S, Boonkered T & Thaithong O (2004) Checklist of bryophytes at the summit of Khao Luang, Huai Yang Waterfall National Park, Prachuap Khiri Khan Province, Thailand. *Natural history bulletin of the Siam society* 52: 163–179.

Clark L & Frye TC (1948) *Frullania intermedia. The Bryologist* 51: 52–54.

Costa DP (2008) Metzgeriaceae. *Flora Neotropica* 102: 1–169.

Crosby MR & Engel JJ (2006) *Index of Hepatics.* (Hattori Botanical Laboratory: Nichinan).

Damsholt K (2002) *Illustrated flora of Nordic liverworts and hornworts.* (Nordic Bryological Society: Lund).

DoE (Department of the Environment) (1997) *Convention on Biological Diversity 1997. National Report to the Conference of the Parties by the Republic of Fiji.* (Department of the Environment, Ministry of Local Government, Housing and Environment: Suva, Fiji).

Eggers J (2006) New bryophyte taxon records for tropical countries 6. *Tropical Bryology* 27: 107–111.

Eggers J & Pócs T (2010) Epiphylle Lebermoose aus Samoa. Auf den Spuren von Eduard Graeffe in der Farn-Abteilung des Herbarium Hamburgense. *Berichte des Botanischen Vereins zu Hamburg* 25: 3-11.

Eifrig H (1936) [1937] Monographische Studien über die indomalayischen Arten von *Taxilejeunea. Annales Bryologici* 9: 73–114.

Engel JJ (1976) *Metzgeria hamata* Lindb., an illegitimate name of Hepaticae. *Lindbergia* 3: 219–220.

Engel JJ (1992) Index Hepaticarum-Supplementum - 1984-1985. *Taxon* 41: 253–306.

Engel JJ & Schuster RM (1985) [1984] An overview and evaluation of the genera of Geocalycaceae subfamily Lophocoleoideae (Hepaticae). *Nova Hedwigia* 39: 385–463.

Engel JJ & Smith Merrill GL (1996) Studies of New Zealand Hepaticae. 14–19. *Kurzia* and *Lepicolea. Journal of the Hattori Botanical Laboratory* 80: 217–231.

Engel JJ & Smith Merrill GL (2004) Austral Hepaticae 35. A taxonomic and phylogenetic study of *Telaranea* (Lepidoziaceae), with a monograph of the genus in temperate Australasia and commentary on extra-Australasian taxa. *Fieldiana, Botany, n.s.* 44: 1–265.

Evans AW (1917) The American species of *Marchantia. Transactions of the Connecticut Academy of Arts and Sciences* 21: 253–261.

Evans AW (1925) A taxonomic study of *Hymenophytum. Bulletin of the Torrey Botanical Club* 52: 491–506.

Evans AW (1932) Some representative species of *Bazzania* from Sumatra. *Papers of the Michigan academy of Science, Arts and Letters* 17: 69–118.

Feldberg K, Váňa J, Hentschel J & Heinrichs J (2010) Currently accepted species and new combinations in Jamesonielloideae (Adelanthaceae, Jungermanniales). *Cryptogamie, Bryologie* 31: 141–146.

Frye TC & Clark L (1944) [1943] Hepaticae of North America part II. *University of Washington Publications in Biology* 6: 163–336.

Fulford M (1963) Manual of the leafy Hepaticae of Latin America I. *Memoirs of the New York Botanical Garden* 11: 1–172.

Furuki T (1991) A taxonomical revision of the Aneuraceae (Hepaticae) of Japan. *Journal of the Hattori Botanical Laboratory* 70: 293–397.

Furuki T (2002) Studies on the bryophyte flora of Vanuatu. 5. Metzgeriales and Marchantiales (Hepaticae). *Annals of the Tsukuba Botanical Garden* 21: 95–101.

Furuki T (2006) Taxonomical studies of the family Aneureaceae (Hepaticae) based on the Philippine collections made by Dr. and Mrs. A. J. Sharp and Dr. Z. Iwatsuki. *Journal of the Hattori Botanical Laboratory* 100: 89–99.

Gao C & Bai X-L (2001) A synoptic revision of family Jungermanniaceae (Hepaticae) in China including some taxa nova. *Philippine Scientist* 38: 111–170.

Gao C, Cao T & Lai MJ (2001) The genus *Saccogynidium* (Geocalycaceae, Hepaticae) in China. *The Bryologist* 104: 126–129.

Geissler P & Bischler H (1985) *Index Hepaticarum vol. 10.* Lembidium *to* Mytilopsis. (J. Cramer: Berlin).

Geissler P & Bischler H (1987) *Index Hepaticarum vol. 8/9.* Jungermannia *to* Lejeunites. (J. Cramer: Berlin).

Geissler P & Bischler H (1989) *Index Hepaticarum vol. 11.* Naiadea *to* Pycnoscenus. (J. Cramer: Berlin).

Geissler P & Bischler H (1990) *Index Hepaticarum vol. 12.* Racemigemma *to* Zoopsis. (J. Cramer: Berlin).

Geissler P & Gradstein SR (1994) On the identity of *Plagiochila lehmanniana* Nees and other species described in the genus *Plagiochila* (Studies in Lejeuneaceae subfam. Pthycanthoideae 23). *Journal of the Hattori Botanical Laboratory* 75: 201–209.

Gibbs LS (1909) A contribution to the montane flora of Fiji (including Cryptogams), with ecological notes. *Journal of the Linnean Society, Botany* 39: 130–212.

Gradstein SR (1975) A taxonomic monograph of the genus *Acrolejeunea* (Hepaticae). *Bryophytorum Bibliotheca* 4: 1–162.

Gradstein SR & Costa DP (2003) The hepaticae and Anthocerotae of Brazil. *Memoirs of the New York Botanical Garden* 87: 1–316.

Gradstein SR, He X-L, Piippo S & Mizutani M (2002) Bryophyte flora of the Huon Peninsula, Papua New Guinea. LXVIII. Lejeuneaceae subfamily Ptychanthoideae (Hepaticae). *Acta Botanica Fennica* 174: 1–88.

Gradstein SR & van Beek J (1985) A revision of the genus *Symbiezidium* Trevis. *Nova Hedwigia, Beiheft* 80: 221–249.

Gradstein SR, Wilson R, Ilkiu-Borges AL & Heinrichs J (2006) Phylogenetic relationships and neotenic evolution of *Metzgeriopsis* (Lejeuneaceae) based on chloroplast DNA sequences and morphology. *Journal of the Linnean Society. Botany* 151: 293–308.

Grolle R (1965) Lebermoose aus Neuguinea. I. *Journal of the Hattori Botanical Laboratory* 28: 43–54.

Grolle R (1966) Lebermoose aus Neuguinea. 2. Zweite Fundliste. *Journal of the Hattori Botanical Laboratory* 29: 70–74.

Grolle R (1968) Einige ostmalesische Lebermoose. *Nova Hedwigia* 16: 147–159.

Grolle R (1969) Großdisjunktionen in artarealen Lateinamerikanischer Lebermoose. *Monographiae biologicae* 19: 562–582.

Grolle R (1971) *Jamesoniella* und Verwandte. *Feddes Repertorium* 82: 1–100.

Grolle R (1979) Miscellania Hepaticologica 181-190. *Journal of the Hattori Botanical Laboratory* 45: 173–183.

Grolle R (1980) Zur kenntnis der Lebermoose von Samoa I. *Wissenschaftliche Zeitschrift der Friedrich-Schiller-Universität Jena/Thüringen. Matematisch-naturwissenschaftliche Reihe* 29: 637–648.

Grolle R (1982) Übersicht der Lejeuneaceae in Tasmanien. *Wissenschaftliche Zeitschrift der Friedrich-Schiller-Universität Jena/Thüringen. Matematisch-naturwissenschaftliche Reihe* 31: 207–227.

Grolle R (1988) Miscellanea Hepaticologica 261-270. *Journal of the Hattori Botanical Laboratory* 65: 403–410.

Grolle R (2002) Two new synonyms of *Metzgeria furcata* (L.) Dumort. *Cryptogamie, Bryologie* 23: 209–210.

Grolle R & Piippo S (1984) Bryophyte flora of the Huon Peninsula, Papua New Guinea. V. Lepidoziaceae subfam. Zoopsoideae and Cephaloziaceae subfam. Schiffnerioideae (Hepaticae). *Annales Botanci Fennici* 21: 299–307.

Grolle R & Piippo S (1986) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XVI. Pallaviciniaceae (Hepaticae). *Acta Botanica Fennica* 133: 59–79.

Grolle R & Reiner-Drehwald ME (1999) Review of the genus *Harpalejeunea* (Lejeuneaceae) including the description of *H. grandis*, a new species from the páramos of Colombia. *Journal of Bryology* 21: 31–45.

Grolle R & Schultze-Motel W (1972)[1973] Vorläufiges Verzeichnis der Lebermoose von Samoa. *Journal of the Hattori Botanical Laboratory* 36: 75–89.

Grolle R & So ML (1999) Notes on *Plagiochila* subgenus *Paraplagiochila* (Hepaticae). *Journal of Bryology* 21: 197–199.

Guo W & Zhang M-X (1999) The taxonomic study of Anthocerotaceae in Shaanxi, Northwest China. *Chenia* 6: 21–33.

Haerida I, Gradstein SR & Tjitrosoedirdjo SS (2010) Lejeuneaceae subfamily Ptychanthoideae (Hepaticae) in West Java. *Gardens' Bulletin. Singapore* 62: 59–111.

Hasegawa J (1984) Taxonomical studies on Asian Anthocerotae IV. A revision of the genera *Anthoceros, Phaeoceros* and *Folioceros* in Japan. *Journal of the Hattori Botanical Laboratory* 57: 241–272.

Hasegawa J (1986a) The Anthocerotae collected by Drs. Z. Iwatsuki and N. Kitagawa in New Caledonia and Fiji. *Journal of the Hattori Botanical Laboratory* 60: 379–390.

Hasegawa J (1986b) A collection of of the Anthocerotae from Seram and Ambon. *Acta Phytotaxonomica et Geobotanica. [Shokubutsu bunrui chiri]* 37: 9–15.

Hasegawa J (1993) Taxonomic studies on Asian Anthocerotae V. A short revision of Taiwanese Anthocerotae. *Acta Phytotaxonomica et Geobotanica. [Shokubutsu bunrui chiri]* 44: 97–112.

Hasegawa J (2000) *Hattorioceros striatisporus* (Hasegawa) Hasegawa newly found in Fiji. *Bryological Research [Seitairui Kenkyu]* 7: 273–275.

Hasegawa J (2002) Studies on the bryophyte flora of Vanuatu. 6. Anthocerotae. *Annals of the Tsukuba Botanical Garden* 21: 103–107.

Hässel de Menéndez GG & Solari SS (1975) Bryophyta Hepaticopsida: Calobryales, Jungermanniales: Vetaformaceae, Balantiopsidaceae. Pp. 7–181 in Guerrera, S.A., Gamundi de Amos, I. & Rabininovich de Halperin, D. (eds.), *Flora Criptogámica de Tierra del Fuego. 15.* (Funcación para la Educación, la Ciencia y la Cultura: Buenos Aires).

Hattori S (1966) Anthocerotae and Hepaticae. Pp. 501–536 in Hara H (ed.), *The flora of eastern Himalaya. Results of the botanical expedition to eastern Himalaya organized by the University of Tokyo 1960 and 1963.* (University of Tokyo Press: Tokyo).

Hattori S (1968) Hepaticae collected by F. Schmid in Ceylon and Pakistan. *Candollea* 23: 287–294.

Hattori S (1973) Notes on Asiatic species of the genus *Frullania*, Hepaticae, II. *Journal of the Hattori Botanical Laboratory* 37: 55–84.

Hattori S (1975a) Studies of the Asiatic species of the genus *Porella* (Hepaticae). V. *Journal of the Hattori Botanical Laboratory* 39: 269–276.

Hattori S (1975b) Notes on Asiatic species of the genus *Frullania*, Hepaticae. VII. *Journal of the Hattori Botanical Laboratory* 39: 277–313.

Hattori S (1975c) Bryophyta, Anthocerotae & Hepaticae (in Ohashi H (ed), Flora of E Himalaya, Third report). *Bulletin, University Museum, University of Tokyo. (Tokyo Daigaku. Sogo Kenkyu Shiryokan)* 8: 206–242.

Hattori S (1975d) A supplementary note on *Porella viridissima. Miscellanea Bryologica et Lichenologica* 7: 46.

Hattori S (1977) Dr. H. Hürlimann's collections of New Caledonian Frullaniaceae. *Journal of the Hattori Botanical Laboratory* 43: 409–438.

Hattori S (1980) A revision of the subgenus *Homotropantha* of the genus *Frullania*, Hepaticae. *Journal of the Hattori Botanical Laboratory* 47: 165–236.

Hattori S (1981) Notes on the Pacific species of Frullanianiaceae (Hepaticae), I. *Journal of the Hattori Botanical Laboratory* 49: 359–383.

Hattori S (1982) A synopsis of New Guinean *Frullania*, Hepaticae. *Journal of the Hattori Botanical Laboratory* 51: 203–271.

Hattori S (1984) New Caledonian Frullaniaceae. *Journal of the Hattori Botanical Laboratory* 57: 405–426.

Hattori S (1985) A small collection of *Frullania* and *Porella* (Hepaticae) made on Viti Levu, Fiji Islands. *Bulletin of the National Science Museum, Tokyo. Series B, Botany* 11: 11–17.

Hattori S (1986a) A synopsis of New Caledonian Frullaniaceae. *Journal of the Hattori Botanical Laboratory* 60: 203–237.

Hattori S (1986b) *Frullania* collection made by Mr. H. Akiyama on Seram Island. *Journal of the Hattori Botanical Laboratory* 60: 239–253.

Hattori S (1986c) Porellaceae from New Caledonia. *Journal of Japanese Botany [Shokubutsu kenkyu zasshi]* 61: 185–192.

Hattori S (1988) *Frullania* flora of Mt. Albert Edward, Papua New Guinea. *Journal of the Hattori Botanical Laboratory* 65: 411–453.

Hattori S & Lin P-J (1985) A preliminary study of Chinese *Frullania* flora. *Journal of the Hattori Botanical Laboratory* 59: 123–169.

Hattori S & Piippo S (1986) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XV. *Frullania* (Frullaniaceae, Hepaticae). *Acta Botanica Fennica* 133: 25–58.

Hattori S, Sharp AJ & Mizutani M (1972) *Schusterella*, a new genus of Jubulaceae (Hepaticae). *Journal of Japanese Botany [Shokubutsu kenkyu zasshi]* 20: 329–338.

Hattori S & Streimann H (1985) A collection of *Frullania* taxa from Papua New Guinea. *Journal of the Hattori Botanical Laboratory* 59: 101–121.

He X-L (1999) A taxonomic monograph of the genus *Pycnolejeunea* (Lejeuneaceae, Hepaticae). *Acta Botanica Fennica* 163: 1–77.

Hentschel J, von Konrat MJ, Pócs T, Schäfer-Verwimp A, Shaw AJ, Schneider H & Heinrichs J (2009) Molecular insights into the phylogeny and subgeneric classification of *Frullania* Raddi (Frullaniaceae, Porellales). *Molecular Phylogenetics and Evolution* 52: 142–156.

Herzog T (1938) Beiträge zur Kenntnis der Gattung *Plagiochila* II. Palaeotropische Arten. *Hedwigia* 78: 222–244.

Herzog T (1939) Studien über *Drepanolejeunea* IV. *Annales Bryologici* 12: 98–122.

Herzog T (1951a)[1952] Miscellanea bryologica. III. *Memoranda societatis pro fauna et flora fennica* 27: 92–110.

Herzog T (1950) [1951b] Miscellanea bryologica. II. Paleotropica. *Memoranda societatis pro fauna et flora fennica* 26: 37–66.

Herzog T (1953) Lebermoosen aus Neukaledonien gesammelt von Dr. O. H. Selling. *Arkiv för Botanik, n.s.* 2: 43–61.

Horikawa Y (1943) Notulae Hepaticologicae. *Acta Phytotaxonomica et Geobotanica. [Shokubutsu buurui chiri]* 13: 212–214.

Hürlimann H (1960) Hepaticae aus dem Gebiete des südlichen Pazifik. I. *Bauhinia* 1: 251–260.

Hürlimann H (1968) Hepaticae aus dem Gebiete des südlichen Pazifik. II. *Bauhinia* 4: 73–84.

Hürlimann H (1974) Hepaticae aus dem Gebiete des südlichen Pazifik. III. *Bauhinia* 5: 59–68.

Hürlimann H (1976) Hepaticae aus dem Gebiete des südlichen Pazifik. IV. *Bauhinia* 5: 191–213.

Hürlimann H (1978) Hepaticae aus dem Gebiete des südlichen Pazifik. VI. *Bauhinia* 6: 293–305.

Hürlimann H (1983) Hepaticae aus dem Gebiete des südlichen Pazifik. VII. *Bauhinia* 7: 259–268.

Hürlimann H (1985) Hepaticae aus dem Gebiete des südlichen Pazifik. VIII. *Bauhinia* 8: 101–118.

Hürlimann H (1987) Hepaticae aus dem Gebiete des südlichen Pazifik. IX. *Bauhinia* 8: 221–234.

Hürlimann H (1989) Hepaticae aus dem Gebiete des südlichen Pazifik. X. *Bauhinia* 9: 153–170.

Hürlimann H (1991) Hepaticae aus dem Gebiete des südlichen Pazifik. XI. *Bauhinia* 9: 257–264.

Hürlimann H (1993) Hepaticae aus dem Gebiete des südlichen Pazifik. XII. *Bauhinia* 11: 3–17.

Hürlimann H (1995) Hepaticae aus dem Gebiete des südlichen Pazifik. XIII. *Bauhinia* 11: 159–175.

Hürlimann H (1998) Hepaticae aus dem Gebiete des südlichen Pazifik XIV. *Bauhinia* 12: 109–119.

Inoue H (1958) The family Plagiochilaceae of Japan and Formosa. II. *Journal of the Hattori Botanical Laboratory* 20: 54–106.

Inoue H (1970) Plagiochilaceae notes, I. On some species of *Plagiochila* from south Pacific Islands. *Journal of the Hattori Botanical Laboratory* 33: 305–316.

Inoue H (1972c) Distribution and speciation of certain sections of *Plagiochila*. *Journal of the Hattori Botanical Laboratory* 35: 25–30.

Inoue H (1981) Notes on the Plagiochilaceae, XI. A review of the species of *Plagiochila* (Dum.) Dum. from Samoa. *Journal of the Hattori Botanical Laboratory* 49: 335–357.

Inoue H (1982) Studies on Taiwan Hepaticae. IV. Plagiochilaceae. *Bulletin of the National Science Museum, Tokyo. Series B, Botany* 8: 125–144.

Inoue H (1984) *The genus* Plagiochila *in Southeast Asia*. (Academic Scientific Books: Tokyo).

Inoue H (1986) Notes on the Plagiochilaceae, XIII. The genus *Plagiochila* (Dum.) Dum. in mainland Australia. *Journal of the Hattori Botanical Laboratory* 60: 357–378.

Inoue H & Iwatsuki Z (1969) Bryophytes of the Bonin Islands and the Volcano Islands (1). *Bulletin of the National Science Museum, n.s.* 12: 291–309.

Inoue H & Miller HA (1965) Hepaticae from Kusaie, Caroline Islands. *Bulletin of the National Science Museum, Tokyo. Series B, Botany* 8: 139–160.

Jack JB & Stephani F (1894) Hepaticae in insulis Vitibuensibus et Samoanis a Dre Ed. Graeffe anno 1864 lectae. *Botanisches Centralblatt* 60: 97–109.

Jones EW (1972) African hepatics XXIII. Some species of *Lejeunea*. *Journal of Bryology* 7: 23–45.

Jovet-Ast S (1951) Hépatiques des Nouvelles-Hebrides. Recoltes de E. Aubert de la Rüe, 1934. *Revue Bryologique et Lichénologique* 20: 96–98.

Jovet-Ast S (1954) Le genre *Colura*. Hepatiques, Lejeuneaceae, Diplasiae (supplement). *Revue Bryologique et Lichénologique* 23: 1–22.

Jovet-Ast S & Tixier P (1962) Hépatiques du Vietnam. II. *Revue Bryologique et Lichénologique* 31: 23–33.

Kitagawa N (1967) Studies on the Hepaticae of Thailand. 1. The genus *Bazzania*, with general introduction. *Journal of the Hattori Botanical Laboratory* 30: 249–270.

Kitagawa N (1972) [1973a] Miscellaneous notes on little-known species of Hepaticae, 1-25. *Journal of the Hattori Botanical Laboratory* 36: 444–454.

Kitagawa N (1973b) Miscellaneous notes on little-known species of Hepaticae, 26-50. *Journal of the Hattori Botanical Laboratory* 37: 263–273.

Kitagawa N (1978) The Hepaticae of Thailand collected by Dr. A. Touw (I). *Acta Phytotaxonomica et Geobotanica. [Shokubutsu bunrui chiri]* 29: 47–64.

Kitagawa N (1979) The Hepaticae of Thailand collected by Dr. A. Touw (II). *Acta Phytotaxonomica et Geobotanica. [Shokubutsu bunrui chiri]* 30: 31–40.

Kitagawa N (1981) Miscellaneous notes on little-known species of Hepaticae, 51-70. *Hikobia, supplement* 1: 67–72.

Koike N (1994) *Frullania* taxa of some islands of Micronesia. *Journal of the Hattori Botanical Laboratory* 75: 183–192.

Koponen T, Enroth J, Fang J-M, Huttunen S, Hyvönen J, Ignatov M, Juslén A, Lai M-J, Piippo S, Potemkin A & Rao P (2000) Bryophyte flora of Hunan Province, China. 1. Bryophytes from Mangshan Nature Reserve and Wulingyuan Global Cultural Heritage Area. *Annales Botanci Fennici* 37: 11–40.

Kuwahara Y (1960) [1961] The genus *Metzgeria* in Pacific Oceania. *Journal of the Hattori Botanical Laboratory* 23: 3–28.

Kuwahara Y (1965) The Metzgeriaceae of Mt. Kinabalu, North Borneo. *Journal of the Hattori Botanical Laboratory* 28: 166–170.

Kuwahara Y (1966) The family Metzgeriaceae in north and south east Asia, Pacific Ocean, Australia and New Zealand. *Revue Bryologique et Lichénologique* 34: 191–239.

Kuwahara Y (1968) Studies of a recent collection of Metzgeriaceae in the Philippines. *Journal of the Hattori Botanical Laboratory* 31: 159–175.

Kuwahara Y (1969) Taxonomic accounts of "the hair-falcate" species of the hepatic genus *Metzgeria*. *Nova Hedwigia* 17: 359–368.

Kuwahara Y (1982) Studies on Colombian Cryptogams XV. On high Andean *Metzgeria* collected by Dr. Antoine M. Cleef in 1972 and 1973. *Proceedings, Koninklijke Nederlandse Akademie van Wetenschappen. Series C, biological and medical sciences* 85(3): 357–380.

Kuwahara Y (1984) Synopsis of section *Biseria* subg. *Metzgeria* Kuw. genus *Metzgeria* Raddi (Hepaticae). *Hikobia* 9: 31–42.

Kuwahara Y (1984) [1985] Annotated key to the species of the Metzgeriaceae from Japan, East Himalayas, Tropical East Asia, and Tropical Oceania. *Nova Hedwigia* 40: 273–285.

Lee GE, Damanhuri A, Latiff A & Gradstein SR (2011) A taxonomic treatment of *Lejeunea discreta*, *L. eifrigii* and *L. sordida*, new to peninsular Malaysia. *Acta Biologica Plantarum Agriensis* 1: 37-51.

Long DG & Grolle R (1990) Hepaticae of Bhutan II. *Journal of the Hattori Botanical Laboratory* 68: 381–440.

McNeill J, Barrie FR, Burdet HM, Demoulin V, Hawksworth DL, Marhold K, Nicolson DH, Prado J, Silva PC, Skog JE, Wiersema JH & Turland NJ (2006) International Code of Botanical Nomenclature (Vienna Code) adopted by the Seventeenth International Botanical Congress Vienna, Austria, July 2005. *Regnum Vegetabile* 146: 1–260.

Meagher D (2010) Studies on *Bazzania* 2. Seven poorly known species from Australia. *Nova Hedwigia* 90: 395–411.

Miller HA (1960) A preliminary list of Micronesian Bryophytes. *The Bryologist* 63: 116–125.

Miller HA (1968) *Herberta* notes. *Journal of the Hattori Botanical Laboratory* 31: 247–250.

Miller HA, Bonner CEB & Bischler H (1962) [1963b] Studies in Lejeuneaceae V. *Microlejeunea* in Pacific Oceania. *Nova Hedwigia* 4: 551–561.

Miller HA, Whittier HO & Bonner CEB (1963a) Bryoflora of the atolls of Micronesia. *Nova Hedwigia, Beiheft* 11: 1–89.

Miller HA, Whittier HO & Whittier BA (1983) Prodromus Florae Hepaticarum Polynesiae. *Bryophytorum Bibliotheca* 25: 1–423.

Mitten W (1861) Musci et hepaticae Vitiensis. *Bonplandia* 9: 365–367.

Mitten W (1862) Musci et Hepaticae Vitiensis. *Bonplandia* 10: 19.

Mitten W (1873) Jungermanniae and Marchantiae. Pp. 325–453 in Seeman B (ed.), *Flora vitiensis, part 10*. (Reeve: London).

Mittermeier RA, Gil PR, Hoffman M, Pilgrim J, Brooks T, Mittermeier CG, Lamoreux J & da Fonseca GAB. (2005) *Hotspots Revisited: Earth's Biologically Richest and Most Threatened Terrestrial Ecoregions* (Cemex, Conservation International and Agrupacion Sierra Madre, Monterrey, Mexico

Mizutani M (1967) Studies of little known Asiatic species of Hepaticae in the Stephani Herbarium. 3. On some little known species of *Cheilolejeunea, Euosmolejeunea* and *Pycnolejeunea*. *Journal of the Hattori Botanical Laboratory* 30: 171–180.

Mizutani M (1972) Studies of little known Asiatic species of Hepaticae in the Stephani Herbarium. 7. Some little known species of the subfamily Lejeuneoideae of the Lejeuneaceae. *Journal of the Hattori Botanical Laboratory* 35: 399–411.

Mizutani M (1976) Studies of little known Asiatic species of Hepaticae in the Stephani Herbarium. 9. Some little known species of the family Lejeuneaceae. *Journal of the Hattori Botanical Laboratory* 40: 441–446.

Mizutani M (1977)[1978b] Lejeuneaceae from the Philippines. *Journal of the Hattori Botanical Laboratory* 43: 127–136.

Mizutani M (1978b) Lejeuneaceae from the Ishigaki and Iriomote Islands of Ryukyu Archipelago. *Journal of the Hattori Botanical Laboratory* 44: 121–136.

Mizutani M (1988) Notes on the Lejeuneaceae. 14. Asiatic species of the genus *Caudalejeunea*. *Journal of the Hattori Botanical Laboratory* 64: 389–399.

Montagne JFC (1843) Quatrieme centurie de plantes cellulaires exotiques nouvelles, décades I-VI. *Annales des Sciences Naturelles, Botanique, ser. 2* 19: 238–266.

Nair MC, Rajesh KP & Madhusoodanan PV (2005) Little known *Plagiochila* (Dum.) Dum. (Plagiochilaceae: Hepaticae) from India. *Geophytology* 35: 39–44.

Pfeiffer T (2000) Molecular relationship of *Hymenophyton* species (Metzgeriideae, Hepaticophytina) in New Zealand and Tasmania. Studies in austral temperate rain forest bryophytes 5. *New Zealand Journal of Botany* 38: 415–424.

Piippo S (1984a) Bryophyte flora of the Huon Peninsula, Papua New Guinea. III. Haplomitriaceae, Lepicoleaceae, Herbertaceae, Pseudolepicoleaceae, Trichocoleaceae, Schistochilaceae, Balantiopsaceae, Pleuroziaceae and Porellaceae (Hepaticae). *Annales Botanici Fennici* 21: 21–48.

Piippo S (1984b) Bryophyte flora of the Huon Peninsula, Papua New Guinea. VI. Lepidoziaceae subfam. Lepidozioideae, Calypogeiaceae, Adelanthaceae, Cephaloziaceae subfam. Cephalozioideae and subfam. Odontoschismatoideae and Jubulaceae (Hepaticae). *Annales Botanci Fennici* 21: 309–335.

Piippo S (1985) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XII. Geocalycaceae (Hepaticae). *Acta Botanica Fennica* 131: 129–167.

Piippo S (1986) A monograph of *Lepidolejeunea* and *Luteolejeunea* (Lejeuneaceae: Hepaticae). *Acta Botanica Fennica* 132: 1–69.

Piippo S (1988) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XXIII. Treubiaceae, Allisoniaceae and Makinoaceae (Metzgeriales, Hepaticae). *Annales Botanici Fennici* 25: 159–164.

Piippo S (1989a) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XXX. Plagiochilaceae (Hepaticae). *Annales Botanci Fennici* 26: 183–236.

Piippo S (1989b) The bryophytes of Sabah (North Borneo) with specieal reference to hte BRYOTROP transect of Mount Kinabalu. III. Geocalycaceae (Hepaticae). *Willdenowia* 18: 513–527.

Piippo S (1991) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XXXIX. *Fossombronia* (Fossombroniaceae) and *Metzgeria* (Metzgeriaceae). *Annales Botanci Fennici* 143: 1–22.

Piippo S (1992) Bryophyte flora of the Huon peninsula, Papua New Guinea. LI. Additions and corrections to the Geocalycaceae (Hepaticae). *Annales Botanci Fennici* 29: 243–248.

Piippo S (1993) Bryophyte flora of the Huon Peninsula, Papua New Guinea. LIV. Anthocerophyta. *Acta Botanica Fennica* 148: 27–51.

Piippo S, He X-L, Juslén A, Tan BC, Murphy DH & Pócs T (2002) Hepatic and hornwort flora of Singapore. *Annales Botanci Fennici* 39: 101–128.

Piippo S, He X-L, Koponen T & Redfearn P, Li J-X (1998) Hepaticae from Yunnan, China, with a checklist of Yunnan Hepaticae and Anthocerotae. *Journal of the Hattori Botanical Laboratory* 84: 135–158.

Pócs T (1984) Synopsis of the African Lepidoziaceae K. Müll. Pp. 107–119 in Váňa J (ed.), *Proceedings of the third meeting of the bryologists from Central and East Europe.* (Univerzita Karlova: Praha).

Pócs T (2008a) Bryophytes from the Fiji Islands, III. The genus *Phaeolejeunea* Mizut. (Lejeuneaceae), with detailed description of *P. amicorum* (Hürl.) Pócs, stat. nov. *Fieldiana, Botany* 47: 139–145.

Pócs T (2008b) Bryophytes from the Fiji Islands, IV. The genus *Frullania* Raddi (Jungermanniopsida), I., with description of *F. vivipara* Pócs, spec. nov. *Fieldiana, Botany* 47: 147–158.

Pócs T & Eggers J (2007) Bryophytes from the Fiji Islands, II. An acccount of the genus *Colura*, with a description of *C. vitiensis* sp. nov. *Polish Botanical Journal* 52: 81–92.

Pócs T, Mizutani M & Piippo S (1994) Bryophyte Flora of the Huon Peninsula, Papua-New-Guinea LXV. Preliminary Contributions on Lejeuneaceae (Hepaticae).1. *Annales Botanci Fennici* 31: 179–190.

Pócs T & Ninh T (2005) Contribution to the bryoflora of Vietnam. VI. On the liverwort flora of Vu Quang Nature Reserve. *Acta Botanica Hungarica* 47: 151–171.

Pócs T, Sass-Gyarmati A, Naikatini A, Braggins J, Pócs S. & von Konrat M (2011) New liverwort (Marchantiophyta) records for the Fiji Islands. *Telopea* 13(3): 455–494.

Pócs T & Streimann H (1999) Epiphyllous liverworts from Queensland, Australia. *Bryobrothera* 5: 165–172.

Pócs T, Tixier P & Jovet-Ast S (1967) Adatok Észak-Vietnam mohaflórájához. II. Seconde contribution à la bryoflore du Nord Vietnam. *Botanikai közlemények* 54: 27–38.

Renner MAM & Brown EA (2008) *Mniolòma* (Calypogeiaceae: Jungermanniopsida) in Australasia: how many species are there?. *Fieldiana, Botany* 47: 159–174.

Renner MAM & de Lange PJ (2009) *Radula multiflora* Gottsche ex Schiffn. – a new record for the Chatham Islands, New Zealand. *Australasian Bryological Newsletter* 57: 12–13.

Sass-Gyarmati A (2003) Records on the distribution of Ptychanthoideae (subfam. of Lejeuneaceae, Hepaticae) in Australia. *Tropical Bryology* 24: 21–31.

Sass-Gyarmati A (2005) *Lopholejeunea pocsii* Gyarmati (Lejeuneaceae, subfam. Ptychanthoideae), a new species of subgenus *Pholianthus* B. Thiers & Gradst. from the Fiji-Islands. *Cryptogamie, Bryologie* 26: 403–410.

Sass-Gyarmati A (2008) Bryophytes from the Fiji Islands, V. *Lopholejeunea vojtkoana* Gyarmati sp. nov. from Fiji Islands (Lejeuneaceae, subfam. Ptychanthoideae). *Nova Hedwigia* 87: 479–486.

Schiffner V (1890) Lebermoose (Hepaticae), mit Zugrundelegung der von Dr. A. C. M. Gottsche ausgeführten Vorarbeiten. Pp. 1–45 in Naumann FC (ed.) *Die Forschungsreise S. M. S. "Gazelle" in der Jahren 1874 bis 1877 unter Kommando des Kapitän zur See Freiherrn von Schleinitz, Vol. IV.* (Berlin).

Schiffner V (1898) Conspectus Hepaticarum Archipelagi Indici. (Batavia).

Schiffner V (1900) *Die Hepaticae der Flora von Buitenzorg. I. Band. Enthaltend die Beschreibung aller bisher aus Java bekannt gewordenen Ricciaceae, Marchantiaceae, Jungermaniaceae Anakrogynae und Jungermaniaceae Akrogynae Unterfam. Epigoniantheae.* (E. J. Brill: Leiden).

Schiffner V (1955) Die Lebermoose der Deutschen Limnologischen Sunda-Expedition. *Archiv für Hydrobiologie, supplement* 21: 382–407.

Schuster RM (1963) Studies in antipodal Hepaticae I. Annotated key to the genera of antipodal Hepaticae with special reference to New Zealand and Tasmania. *Journal of the Hattori Botanical Laboratory* 26: 185–309.

Schuster RM (1964) Studies on antipodal Hepaticae VI. The suborder Perssonellinae: morphology, anatomy and possible evolution. *Bulletin of the Torrey Botanical Club* 91: 479–490.

Schuster RM (1968) Studies on the Hepaticae, XXIX-XLIV. A miscellany of new taxa and new range extensions. *Nova Hedwigia* 15: 437–529.

Schuster RM (1969) Problems of the antipodal distribution in lower land plants. *Taxon* 18: 46–91.

Schuster RM (1970) Studies on Antipodal Hepaticae, III. *Jubulopsis* Schuster, *Neohattoria* Kamimura and *Amphijubula* Schuster. *Journal of the Hattori Botanical Laboratory* 33: 266–304.

Schuster RM (1980a) Studies on Hepaticae. LIV-LVIII. *Kurzia* v. Mart. (*Microlepidozia* (Spr.) Joerg.), *Megalembidium* Schust., *Psilocłada* Mitt., *Drucella* Hodgs. and *Isolembidium* Schust. *Journal of the Hattori Botanical Laboratory* 48: 337–421.

Schuster RM (1980b) *The Hepaticae and Anthocerotae of North America, vol. IV.* (Columbia University Press: New York).

Schuster RM (1984) Phytogeography of the Bryophyta. Pp. 463–626 in Schuster RM (ed.), *New Manual of Bryology, vol. 1.* (Hattori Botanical Laboratory: Nichinan).

Schuster RM (1992a) *The Hepaticae and Anthocerotae of North America, vol. V.* (Columbia University Press: New York).

Schuster RM (1992b) *The Hepaticae and Anthocerotae of North America, vol. VI.* (Columbia University Press: New York).

Schuster RM (1999) Studies on Hepaticae LXVI. Lepidoziaceae subfam. Zoopsidoideae (3): *Zoopsidella*. *Nova Hedwigia* 69: 101–150.

Schuster RM (2000) Austral Hepaticae, Part. 1. *Nova Hedwigia, Beiheft* 118: 1–524.

Schuster RM (2002) Austral Hepaticae, part II. *Nova Hedwigia, Beiheft* 119: 1–606.

Schuster RM & Konstantinova NA (1995) Studies on Treubiales, I. On *Apotreubia* Hatt. et al. and *A. hortonae* Schust. & Konstantinova, sp. n. *Journal of the Hattori Botanical Laboratory* 78: 41–61.

Schuster RM & Scott GAM (1969) A study of the family Treubiaceae (Hepaticae; Metzgeriales). *Journal of the Hattori Botanical Laboratory* 32: 219–257.

Scott GAM & Bradshaw JA (1985) Australian liverworts (Hepaticae): Annotated list of binominals and check-list of published species with bibliography. *Brunonia* 8: 1–171.

Singh AP, Kumar D & Nath V (2008) Studies on the genera *Frullania* Raddi and *Jubula* Dum. from Meghalaya (India): Eastern Himalayas. *Taiwania* 53: 51–84.
So ML (2000) Studies on *Plagiochila* (Hepaticae) in Australasia and the Pacific II. *Cryptogamie, Bryologie* 21: 223–231.
So ML (2001a) *Plagiochila* (Hepaticae, Plagiochilaceae) in China. *Systematic Botany Monographs* 60: 1–214.
So ML (2001b) Recognized species of *Plagiochila* in Australasia and some island groups of the Pacific Ocean. *New Zealand Journal of Botany* 39: 395–421.
So ML (2002) The Genus *Porella* (Porellaceae, Hepaticae) in Australasia and the South Pacific. *Systematic Botany* 27: 4–13
So ML (2006) *Radula* (Radulaceae, Marchantiophyta) in the South Pacific. *Journal of the Hattori Botanical Laboratory* 99: 207–232.
So ML & Grolle R (1999) Studies on *Plagiochila* in Asia: supplements to sections *Abietinae, Annotinae, Ciliatae, Contiguae, Cucullatae, Poeltiae, Subtropicae* and *Zonatae*. *Cryptogamie, Bryologie* 20: 167–179.
So ML & Grolle R (2000) Studies on *Plagiochila* (Hepaticae) in Australasia and the Pacific. I. *Cryptogamie, Bryologie* 21: 7–18.
So ML & Grolle R (2001) On *Plagiochila* subgenus *Plagiochila* section *Abietinae* (Hepaticae). *Systematic Botany* 26: 459–469.
Söderström L, Gradstein SR & Hagborg A (2010) Checklist of hornworts and liverworts for Java. *Phytotaxa* 9: 53–149.
Söderström L, Hagborg A, von Konrat M & Renner MAM (2008) Early Land Plants Today: Liverwort checklist of checklists. *Fieldiana, Botany, n.s.* 47: 105–130.
Söderström L, Urmi E & Váňa J (2007) The distribution of Hepaticae and Anthocerotae in Europe and Macaronesia — Update 1–427. *Cryptogamie, Bryologie* 28: 299–350.
Solari SS (1983) Patagonian bryophytes 8. On the identity of *Lepicolea scolopendra* (Hook.) Trev. var. *magellanica* Gola and *Sendtnera ochroleuca* (Spreng.) Nees var. *piligera* De Not. *Lindbergia* 9: 86–88.
Stephani F (1893a) Hepaticarum species novae. Pars I. *Hedwigia* 32: 17–29.
Stephani F (1893b) Hepaticarum species novae. Pars II. *Hedwigia* 32: 137–147.
Stephani F (1894) Hepaticarum species novae VI. *Hedwigia* 33: 137–169.
Stephani F (1896) Hepaticarum species novae IX. *Hedwigia* 35: 73–140.
Stephani F (1896) [1897] Hepaticae (in: Reinecke F, Die Flora der Samoa-Inseln). *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 23: 300–316.
Stephani F (1898) Species Hepaticarum 1. *Bulletin de l'Herbier Boissier* 6 (5): 361–378.
Stephani F (1899a) Species Hepaticarum 1. *Bulletin de l'Herbier Boissier* 7 (7): 518–533.
Stephani F (1899b) Species Hepaticarum 1. *Bulletin de l'Herbier Boissier* 7 (9): 655–695.
Stephani F (1899c) Species Hepaticarum 1. *Bulletin de l'Herbier Boissier* 7 (10): 727–764.
Stephani F (1899d) Species Hepaticarum 1. *Bulletin de l'Herbier Boissier* 7: 927–956.
Stephani F (1900) Species Hepaticarum 1. *Mémoires de l'Herbier Boissier suite au Bulletin de l'Herbier Boissier* 11: 1–49.
Stephani F (1901) Species Hepaticarum 2. *Bulletin de l'Herbier Boissier, série 2* 1: 1022–1151.
Stephani F (1903a) Species Hepaticarum 2. *Bulletin de l'Herbier Boissier, série 2* 3: 98–129.
Stephani F (1903b) Species Hepaticarum 2. *Bulletin de l'Herbier Boissier, série 2* 3: 522–537.
Stephani F (1903c) Species Hepaticarum 2. *Bulletin de l'Herbier Boissier, série 2* 3: 959–974.
Stephani F (1904a) Species Hepaticarum 2. *Bulletin de l'Herbier Boissier, série 2* 4: 18–32.
Stephani F (1904b) Species Hepaticarum 2. *Bulletin de l'Herbier Boissier, série 2* 4: 153–168.
Stephani F (1908a) Species Hepaticarum 3. *Bulletin de l'Herbier Boissier, série 2* 8(11): 837–866.
Stephani F (1908b) Species Hepaticarum 3. *Bulletin de l'Herbier Boissier, série 2* 8(12): 941–966.
Stephani F (1909) *Species Hepaticarum 4.* (George & Co.: Genève & Bale).
Stephani F (1910) *Species Hepaticarum 4.* (George & Co.: Genève & Bale).
Stephani F (1911) *Species Hepaticarum 4.* (George & Co.: Genève & Bale).
Stephani F (1912) *Species Hepaticarum 5.* (George & Co.: Genève & Bale).

Stephani F (1913) *Species Hepaticarum 5.* (George & Co.: Genève & Bale).
Stephani F (1914) *Species Hepaticarum 5.* (George & Co.: Genève & Bale).
Stephani F (1915) *Species Hcpaticarum 5.* (George & Co.: Genève & Bale).
Stephani F (1916) *Species Hepaticarum 5.* (George & Co.: Genève & Bale).
Stephani F (1922) *Species Hepaticarum 6.* (George & Co.: Genève & Bale).
Thiers BM (1983) Index to the genera and species of Hepaticae described by William Mitten. *Brittonia* 35: 271–300.
Thiers BM (1985) Branching in Lejeuneaceae III. Ptychanthoideae. *Nova Hedwigia, Beiheft* 80: 31–61.
Thiers BM (1992a) New species of *Cheilolejeunea* and *Otolejeunea* (Hepaticae, Lejeuneaceae) from Australia. *Brittonia* 44: 160–165.
Thiers BM (1992b) A re-evaluation of *Cheilolejeunea* subgenus *Xenolejeunea. Tropical Bryology* 5: 10–21.
Thiers BM (1993) A monograph of *Pleurozia* (Hepaticae, Pleuroziaceae). *The Bryologist* 96: 517–554.
Thiers BM & Gradstein SR (1989) Lejeuneaceae (Hepaticae) of Australia. 1. Subfamily Ptychanthoideae. *Memoirs of the New York Botanical Garden* 52: 1–79.
Tixier P (1970) Bryophytae Indosinicae. Bryophytes from Thai Tenasserim. *Natural history bulletin of the Siam society* 23: 541–559.
Tixier P (1985) Contribution à la connaissance des Cololejeunoideae. *Bryophytorum Bibliotheca* 27: 1–439.
Udar R & Awasthi US (1982) The genus *Drepanolejeunea* St. in India. *Journal of the Hattori Botanical Laboratory* 53: 419–437.
Váňa J (1973a) Lebermoose aus Neuguinea. 10. *Jungermannia. Journal of the Hattori Botanical Laboratory* 37: 185–190.
Váňa J (1973b "1972") Miscellaneous notes on the Asiatic Jungermannioideae II. *Journal of the Hattori Botanical Laboratory* 36: 57–74.
Váňa J (1975) Studien über die Jungermannioideae (Hepaticae). 8. *Jungermannia* subg. *Plectocolea* und *Solenostoma* in Australien, Neuseeland und Ozeanien. *Folia Geobotanica et Phytotaxonomica* 10: 277–323.
Váňa J (1991a) The bryophytes of Sabah (North Borneo) with special reference to the BRYOTROP transect of Mt. Kinabalu. XIII. Jungermanniaceae (Hepaticopsida, Jungermannialaes). *Willdenowia* 20: 171–183.
Váňa J (1991b) The bryophytes of Sabah (North Borneo) with special reference to the BRYOTROP transect of Mt. Kinabalu. XV. Lophoziaceae (Hepaticae). *Willdenowia* 20: 199–219.
Váňa J & Inoue H (1983) Studies in Taiwan Hepaticae. V. Jungermanniaceae. *Bulletin of the National Science Museum, Tokyo. Series B, Botany* 9: 125–142.
Váňa J & Piippo S (1989a) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XXIX. Jungermanniaceae and Gymnomitraceae (Hepaticae). *Annales Botanci Fennici* 26: 107–125.
Váňa J & Piippo S (1989b) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XXXI. Cephaloziaceae subfam. Allobielloideae, Cephaloziellaceae, Antheliaceae and Lophoziaceae (Hepaticae). *Annales Botanci Fennici* 26: 263–290.
Váňa J, Piippo S & Koponen T (2005) Bryophyte flora of Hunan Province, China, 6. Jungermanniaceae and Gymnomitraceae (Hepaticae). *Acta Botanica Fennica* 178: 57–78.
Verdoorn F (1928) Kritische bemerkungen ueber ostasiatische und ozeanische *Frullania*-Arten aus dem subgenus *Homotropantha* (De Frullaniaceis III). *Revue Bryologique et Lichénologique* 1: 109–122.
Verdoorn F (1930) Revision der von Ozeanien angefuhrten Frullaniaceae (De Frullaniaceis VIII). *Nederlandsch Kruidkundig Archief. Verslagen en Medcdelingen der Nederlandsche Botanische Vereeniging* 1930: 155–175.
Verdoorn F (1934) Die Frullaniaceis XIV. Revision der von Ozeanien, Australien und Neuseeland angeführten Lejeuneaceae Holostipae. *Blumea* 1: 216–240.

Verdoorn F (1937) On some new collections of Asiatic and Oceanic Jubulae (De Frullaniaceis XVIII). *Blumea Supplement* 1: 210–213.

von Konrat M, Naikatini A, Tuiwawa M, Söderström L, Fife A, Renner M, Brownsey P, Perrie L, Hagborg A, Pócs T, Lumbsch HT, Braggins J, Séneca A & Brown E (2011) A brief history of the cryptogams of Fiji and prospects for the future. *Telopea* 13: 361–374.

von Konrat MJ, Braggins JE, Asakawa Y & Toyota M (2006) *Frullania chevalieri* (Jubulaceae) in New Zealand, with a reassessment of *Schusterella*. *The Bryologist* 109: 141–156.

von Konrat M, Pócs T, Naikatini A, Tuiwawa M, Söderström L, Brownsey P, Braggins J, Brown E & Fife A (2011) Fiji cryptogams: A brief history and prospects for the future. *Telopea* 13(3): 361–374.

von Konrat MJ, Söderström L, Hagborg A, Crosby MR & Engel JJ (2010b) Early Land Plants Today: Index of liverworts & hornworts 2006-2008. *Cryptogamie, Bryologie* 31: 3–30.

von Konrat M, Söderström L & Hagborg A (2010a) The Early Land Plants Today project: A community-driven effort and a new partnership with Phytotaxa. *Phytotaxa* 9: 11–21.

Wilson R, Gradstein SR, Schneider H & Heinrichs J (2007) Unravelling the phylogeny of Lejeuneaceae (Jungermanniopsida): evidence for four lineages. *Molecular Phylogenetics and Evolution* 43: 270–282.

Yamada K (1975) *Radula* collections made by Dr. H. Inoue in Ceylon. *Journal of Japanese Botany [Shokubutsu kenkyu zasshi]* 50: 372–378.

Yamada K (1979) A revision of Asian taxa of *Radula*, Hepaticae. *Journal of the Hattori Botanical Laboratory* 45: 201–322.

Yamada K (1984) Notes on new record of three *Radula* species (Hepaticae) from Fiji. *Proceedings of the bryological society of Japan* 3: 181–182.

Yamada K (1985) *Radula* collections made by Drs. Z. Iwatsuki and N. Kitagawa in New Caledonia. *Journal of the Hattori Botanical Laboratory* 58: 111–130.

Yamada K (1999) Taxonomy of the section *Amentulosae* of genus *Radula* (Radulaceae, Hepaticae). *Haussknechtia, Beiheft* 9: 391–398.

Yamada K & Hayashi M (2003) Studies on the bryophyte flora of Vanuatu. 8. *Heteroscyphus* (Geocalycaceae, Hepaticae). *Bulletin of the National Science Museum, Tokyo. Series B, Botany* 29: 149–152.

Yamada K & Piippo S (1989) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XXXII. *Radula* (Radulaceae, Hepaticae). *Annales Botanci Fennici* 26: 349–387.

Yang J-D & Lin S-H (2008) *Cheilolejeunea falsinervis* (Marchantiophyta) newly recorded for Taiwan. *Bryological Research [Sentairui Kenkyu]* 9: 319–321.

Yang J-D & Lin S-H (2009) *Lejeunea sordida* (Marchantiophyta) newly recorded for Taiwan. *Bryological Research [Sentairui Kenkyu]* 9: 388–390.

Yuzawa Y (1991) A monograph of subgen. *Chonanthelia* of gen. *Frullania* (Hepaticae) of the world. *Journal of the Hattori Botanical Laboratory* 70: 181–291.

Zhu R-L (2006) On *Cheilolejeunea tenella* (Jungermanniopsida: Lejeuneaceae), a poorly known species from Singapore. *Annales Botanci Fennici* 43: 484–487.

Zhu R-L & Gradstein SR (2005) Monograph of *Lopholejeunea* (Spruce) Schiffn. (Lejeuneaceae, Hepaticae) in Asia. *Monographs in Systematic Botany from the Missouri Botanical Garden* 74: 1–98.

Zhu R-L & Grolle R (2004) Nomenclatural notes on *Cheilolejeunea inaequitexta* and *C. trapezia* (Lejeuneaceae, Hepaticae). *Annales Botanci Fennici* 41: 445–447.

Zhu R-L & Lai M-J (2005) *Cheilolejeunea decursiva* (Sande Lac.) R. M. Schust. and *C. ventricosa* (Schiffn.) X. L. He (Lejeuneaceae, Hepaticae) new to Australia. *Journal of the Hattori Botanical Laboratory* 98: 193–203.

Zhu R-L & So ML (2001) Epiphyllous liverworts of China. *Nova Hedwigia, Beiheft* 121: 1–418.

Manuscript received 12 January 2011, accepted 15 August 2011

Telopea 13(3) 455–494

New liverwort (Marchantiophyta) records for the Fiji Islands

Tamás Pócs[1], Andrea Sass-Gyarmati[1], Alifereti Naikatini[2], Marika Tuiwawa[2], John Braggins[3], Sarolta Pócs[1], and Matt von Konrat[4]

[1]*Botany Department, Eszterházy College, Eger. Pf. 43, H-3301, Hungary*
[2]*Institute of Applied Science, University of the South Pacific, Private Bag, Suva, Fiji*
[3]*Auckland War Memorial Museum, Auckland, New Zealand*
[4]*Botany Department, The Field Museum, Chicago, Illinois 60605-2496, U.S.A.*

Abstract

Forty-eight species of liverworts (Marchantiophyta) are reported as new to the Fiji Islands. These records increase the number of Fijian liverworts by over 20%. Extensions of range within Fiji are reported for an additional 39 taxa already known to occur within the Fijian archipelago. These records indicate that the Fijian flora is understudied and many localities in Fiji, including entire islands, remain under-collected for bryophytes. *Metalejeunea crassitexta* (J.B.Jack et Steph.) Pócs is proposed as a new combination, and *Lejeunea microstipula* Steph. is reduced to a synonym of *Lejeunea exilis* (Reinw., Blume et Nees) Grolle.

Introduction

The Republic of Fiji consists of over 300 islands of varying sizes with an aggregate land area of about 18,300 km^2 as well as many smaller islets and off-shore rocks (DoE 1997). Many localities in Fiji, including entire islands, remain under-collected for many plant groups (DoE 1997). Von Konrat et al. (2011, this issue) provides an overview of the current state of floristic knowledge for Fijian liverworts. Historically, very few publications have focused solely on collections from Fiji. However, in the last decade, there has been an increasing interest in the Fijian liverwort flora, as exemplified by Pócs (2008a, b), Pócs & Eggers (2007) and field programs. This paper reports on new records, mostly collected by the first author with his wife, Sarolta Pócs, in 2003, as well as those on a joint expedition in 2008 organised by Matt von Konrat (F). The records are divided into two parts: a) new records for the Fiji Islands, represented by 48 taxa; and b) records for 39 taxa that are island range extensions. These reports cover the highlands of Taveuni, Viti Levu and Kadavu.

© 2011 Royal Botanic Gardens and Domain Trust ISSN0312-9764

Methodology and materials

If not otherwise stated, the specimens were identified by the senior author. All specimens are deposited in EGR, with duplicates in F and SUVA. To reduce the length of the paper, and to avoid unnecessary duplication of detailed locality data, abbreviated specimen data is provided in the 'Specimens examined' section and full locality data can be cross referenced by the collection number in Appendix 1. For example, an abbreviated collection appears as follows in the text: Taveuni Island: *T. Pócs 08013/H.* In Appendix 1, this corresponds to: 08013 - TAVEUNI Island, NW slope of DES VOEUX (DEVO) peak, below PWD Weather Station, at 900-1100 m alt. S 16°50'18–28", W 179° 57'57–58". Montane mossy forest. 11 Apr. 2008. The alphabetical letters that typically follow the collection numbers of the first author refer to multiple collections at the same locality. For many taxa the distribution has been extracted from the Early Land Plant Today (ELPT) databases of Söderström and Hagborg to supplement cited literature. The distribution and mapping of ELPT is described by von Konrat et al. (2010). Type data also are provided. Sources include the ELPT database and the online version of Index Hepaticarum (see: http: //www.ville-ge.ch/musinfo/bd/cjb/hepatic/index.php). Type data is typically presented with the type country, followed by type information directly derived from the protologue. Where we have not been able to cite data directly from the published protologue, we defer to Index Hepaticarum (IH) online, which we cite as the source. In many cases the type data is cited directly from a cited reference.

Nomenclatural novelties

The following two nomenclatural novelties are made. The rationale is described in detail under the respective species in the main body of the list.

Lejeunea exilis (Reinw., Blume et Nees) Grolle, Journal of the Hattori Botanical Laboratory 46: 353 (1979)

Basionym: *Jungermannia exilis* Reinw., Blume et Nees, Nova Acta Physico-Medica Academiae Caesareae Leopoldino-Carolinae Naturae Curiosorum Exhibentia Ephemerides sive Observationes Historias et Experimenta 12: 227 (1824) [1825]

Synonym: *Lejeunea microstipula* Steph. Hedwigia 29: 89, 139, XVI (1890) "*Micro-Lejeunea*" **syn. nov.**

Metalejeunea crassitexta (J.B.Jack et Steph.) Pócs, **comb. nov.**

Basionym: *Microlejeunea crassitexta* J.B.Jack et Steph., Botanisches Centralblatt 60: 106 (1894)

New records for the Fiji Islands

The following 48 taxa are reported new to the islands of Fiji.

1. ***Bazzania falcifolia*** (Steph.) H.A.Mill., Phytologia 47: 320 (1981)

Basionym: *Mastigobryum falcifolium* Steph., Denkschriften der Kaiserlichen Akademie der Wissenschaften, Wien. Mathematisch-Naturwissenschaftliche Klasse 88: 33 (1911)

Type citation: Samoa, "Insel Upolu. In Urwäldern bei Tiavi, auf Bäumen. Nr. 5370" *leg. Rechinger*. Source: IH online.

Illustration: Stephani (1985: 6879).

Specimens examined: Taveuni Island: *T. Pócs 08013/H.*

Bazzania falcifolia has previously been reported for New Caledonia and Samoa (Miller et al. 1983).

2. ***Bazzania manillana*** (Gottsche ex Steph.) S.Hatt., Botanical Magazine, Tokyo 64: 113 (1951)

Basionym: *Mastigobryum manillanum* Gottsche ex Steph., Hedwigia 25: 204 (1886)

Type citation: Philippines, "Manila, *leg. Gaudichaud* (Holotype: hb. Gottsche)".

Illustration: Stephani (1985: 007142).

Specimens examined: Taveuni Island: *T. Pócs 08013/D.*

Bazzania manillana has previously been reported for Peninsular Malaysia, Philippines, Indonesia (Java), New Guinea, and Samoa (cf. ELPT database).

3. ***Cheilolejeunea lindenbergii*** (Gottsche) Mizut., Journal of the Hattori Botanical Laboratory 33: 226 (1970)

Basionym: *Lejeunea lindenbergii* Gottsche, Synopsis Hepaticarum 3: 336 (1845)

Type citation: Bangladesh, "prope Sylhet, Indiae orientalis (Wallich in Hb. L[ehmann])" - Sri Lanka "in Insula Ceylon... (Hb. H[oo]k[er]) n. 51 ex annotationibus Lindenbergii. Hb. L[ehmann] et N[ees])".

Illustration: Mizutani (1967: 174, fig.III as *Cheilolejeunea luerssenii*).

Specimens examined: Taveuni Island: *S. & T. Pócs 03299/P.*

Cheilolejeunea lindenbergii was previously thought to be endemic to the Malesian region (Piippo 1994).

4. ***Cheilolejeunea occlusa*** (Herzog) T.Kodama et N.Kitag., Bulletin of the Osaka Museum of Natural History. Osaka. 28: 40 (1974).

Basionym: *Strepsilejeunea occlusa* Herz., Transactions of the *British* Bryological *Society* 1: 320 (1949)

Type citation: Malaysia (Sarawak), "Dulit Ridge, c. 1230 m, rambling on Chiloscyphus aselliformis var. neesii, on tree trunks in open 'Mossy Forest", no. 2200 p.p.".

Illustration: Mizutani (1980: 324, fig. 3).

Specimen examined: Viti Levu Island: *S. & T. Pócs 03274/AT.*

Cheilolejeuna occlusa is also known from Indonesia (Sumatra and Borneo) (Mizutani 1980).

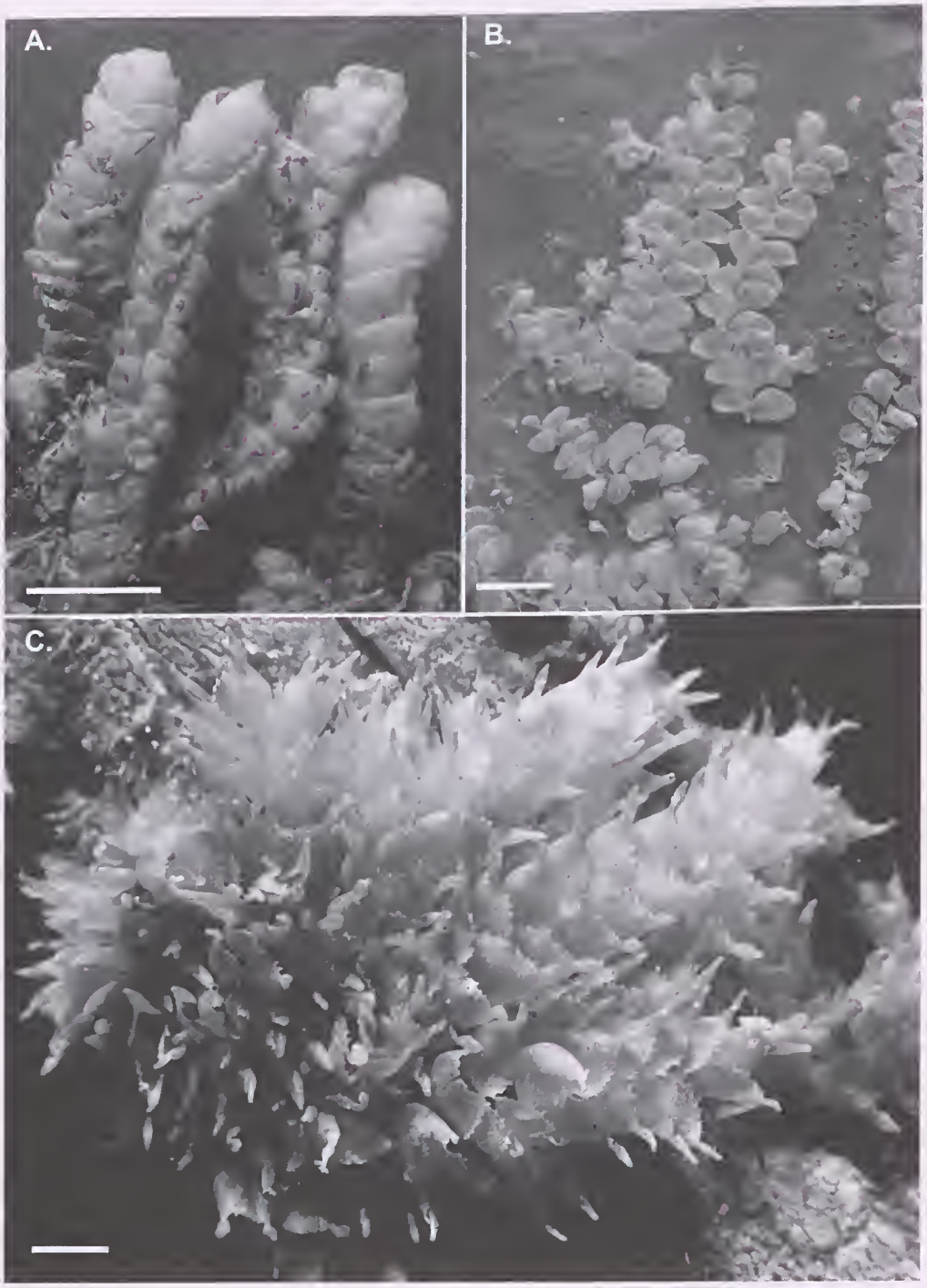

Fig. 1. **A,** *Pleurozia conchifolia*, habit (*S. & T. Pócs 03279/N*), scale bar 2.5 mm; **B,** *Cololejeunea aequabilis*, epiphyllous habit (*S. & T. Pócs 03280/CP*), scale bar 1 mm; **C,** *Colura brevistyla*, habit on bark (*T. Pócs 08036/V*), scale bar 1 mm.

5. *Cololejeunea aequabilis* (Sande Lac.) Schiffn., Conspectus Hepaticarum Archipelagi Indici: 242 (1898) **Fig. 1b**

Basionym: *Lejeunea aequabilis* Sande Lac., Annales Museum Botanicum Lugduno-Batavi 1: 310 (1864)

Type citation: Indonesia. Java, "prov. Bantam, in foliis Anonaceae", *leg. Blume.*

Illustration: Zhu et al. (1999: 294, fig.1 as *Cololejeunea yulensis*).

Specimens examined: Taveuni Island: *S. & T. Pócs 03280/BK, 03280/BP*; Viti Levu Island: *S. & T. Pócs 03271/AB, 08037/E; A.J. Fife 08037/G, Q.*

Cololejeunea aequabilis appears to be a Southeast Asian and Oceanian species , occurring in China, Indonesia, Japan, Vietnam, and Samoa (Zhu 2005).

6. *Cololejeunea amphibola* B.M.Thiers, Beihefte zur Nova Hedwigia 90: 130 (1988)

Type citation: Australia. "Queensland. Cook Dist.: Millaa Millaa Falls National Park, 900 m, 17°31'S, 145°38'E. *Thiers & Halling 2210b*, Jul 5, 1984 (Holotype: AD, isotype: NY)".

Illustration: Thiers (1998: 131, pl.1).

Specimens examined: Taveuni Island: *S. & T. Pócs 03279/CC, 03280/CL, 03289/BK pp*; Viti Levu Island: *S. & T. Pócs 03274/BH, BY.*

Cololejeunea amphibola has previously been reported for Borneo, Sulawesi, New Guinea, and Australia (Queensland) (Eggers et al. 1998).

7. *Cololejeunea angustiflora* (Steph.) Mizut., Journal of the Hattori Botanical Laboratory 28: 113 (1965)

Basionym: *Leptocolea angustiflora* Steph., Species Hepaticarum 5: 848 (1915)

Type citation: New Guinea. "Nova Guinea" No detailed collection data.

Illustration: Mizutani (1965: 114, fig. IV); Zhu & So (2002: 432, figs 1-23).

Specimens examined: Taveuni Island: *S. & T. Pócs 0279/AV, 0280/CQ.*

Cololejeunea angustiflora has previously been reported from China (Taiwan), Philippines, Indonesia, Malaysia, Papua New Guinea, and New Caledonia (Zhu & So 2002).

8. *Cololejeunea cardiocarpa* (Mont.) A.Evans, Memoirs of the Torrey Botanical Club 8: 172 (1902)

Basionym: *Lejeunea cardiocarpa* Mont., de la Sagra, Histoire Physique, Politique et Naturelle de l'Île de Cuba, Botanique, Plantes Cellulaires: 476 (1842)

Type citation: Cuba. "Ad folia Calophylli Calabae repentem in Cuba insula legerunt hanc speciem clarr. Ramon de la Sagra et Auber" (Isotype: PC!).

Illustration: Schuster (1980: 1279, fig. 765); Asthana & Srivastava (2003: 100, pl. 16).

Specimens examined: Viti Levu Island: *S. & T. Pócs 03260/N.*

Cololejeunea cardiocarpa is a widespread species known from the Neotropics with

outliers in the south-eastern USA, Africa, and records from New Caledonia, tropical Australia, and New Zealand (Braggins 1999) as well as from Tonga and Tahiti Is. (Hürlimann 1987).

9. ***Cololejeunea cocoscola*** Tixier, Cryptogamie: Bryologie, Lichénologie 14: 353 (1993)

Type citation: Tonga. "Ouest de Neiafu (Vava'u), 50 m., *Hürlimann T873a* (Holotype: hb. Hürlimann)".

Illustration: Tixier (1993: 354, fig. 1).

Specimens examined: Kadavu Island: *S. & T. Pócs 03302/C, 03303/J, 03303/AN*; Viti Levu Island: *S. & T. Pócs 03255/B, 03267/C*; Taveuni Island: *S. & T. Pócs 03283/O, 03284/C,03285/BB, 03287/J, T Pócs 08015/C.*

Cololejeunea cocoscola had previously been reported only from Tonga (Miller et al. 1983).

10. *Cololejeunea diaphana* A.Evans, Bulletin of the Torrey Botanical Club 32: 184 (1905)

Type citation: U.S.A., Florida, "in hammocks near the homestead trail, between Cutler and Camp Longview, *leg. Small & Carter 1365 p. p., 1370 p. p.*".

Illustration: Evans (1905: 184, pl. 5); Schuster (1980: 1295, fig. 765; 1980: 1299, fig. 769 as *Aphanolejeunea diaphana*).

Specimens examined: Taveuni Island: *S. & T. Pócs 03280/BJ, 03288/CY, 03289/CV.*

Cololejeunea diaphana is new to the South Pacific. Pócs & Bernecker (2009) recognised *C. diaphana* as a Pantropical taxon distributed in tropical America, Africa and Asia.

11. *Cololejeunea equialbi* Tixier, Annales de la Faculté des Sciences, Université de Phnom Penh 3: 178 (1970)

Type citation: Vietnam. Thua Thien, Bach Ma, alt. 1400 m, *Tixier 2309*, 1962; Holotype, PC (Tixier 1985).

Illustration: Tixier (1985: 304, fig. 63); Zhu & So (2001: 287, fig. 108).

Specimens examined: Kadavu Island: *S. & T. Pócs 03309/BD*; Taveuni Island: *S. & T. Pócs 03290/BD.*

Cololejeunea equialbi is a Southeast Asian species (Piippo 1994), with records from China (Gansu, Shanxi, Yunnan, Hainan), Japan (Nansei-Shoto (Ryu-Kyu Is)), Vietnam, Philippines, Indonesia (Sulawesi, Moluccas), and New Guinea (c.f. ELPT database).

12. *Cololejeunea falcata* (Horik.) Benedix, Feddes Repertorium Specierum Novarum Regni Vegetabilis. Beiheft 134: 29 (1953)

Basionym: *Physocolea falcata* Horik., Journal of Science of Hiroshima University, Series B, Division 2 (Botany) 1: 22. f. 6. (1931)

Type citation: Japan. Bonin Islands [= Ogasawara Gunto] "Bonin: Insl. Chichijima (*Y. Horikawa no. 1962a-type*, July 1930)" (Holotype: HIRO). Source: IH online.

Illustration: Tixier (1979: 738, fig. 9); Thiers (1988: 140, pl.1).

Specimens examined: Taveuni Island: *S. & T. Pócs 03299/BB, BC. 03280/BO, 03281/AC, 03288/BO 03289/BM, 03290/*E; Viti Levu Island: *A.J. Fife 08037/B*; Vanua Levu Island: *M. von Konrat 0624-9 pp.*

Cololejeunea falcata has been recorded from Madagascar, China (including Taiwan), Japan, Taiwan, Ogasawara-shoto (Bonin), Sri Lanka, Thailand, Vietnam, Cambodia, Peninsular Malaysia, Sumatra, Borneo, Philippines, Indonesia, New Guinea, Queensland, New Caledonia, and Mariana Is (cf. ELPT database).

13. *Cololejeunea floccosa* (Lehm. et Lindenb.) Schiffn., Conspectus Hepaticarum Archipelagi Indici: 243 (1898)

Basionym: *Jungermannia floccosa* Lehm. et Lindenb., Novarum et Minus Cognitarum Stirpium Pugillus 5: 26 (1833)

Type citation: Philippines, "Insula Luzon, ad portum Sorzogon, in foliis arborum. Sine nomine communicavit cl. Prof. Presl".

Illustration: Benedix (1953: 134, pl. 4); Zhu & So (2001: 343, fig. 128).

Specimens examined: Taveuni Island: *S. & T. Pócs 03289/EN.*

Cololejeunea floccosa was reported by Piippo (1994) as a Paleotropical species.

14. *Cololejeunea hirta* Steph., Bulletin of Miscellaneous Information, Royal Gardens, Kew 1899: 125 (1899)

Type citation: Papua New Guinea. "Vanapa valley, 2000–4000 ft.".

Illustration: Tixier (1985: 290, fig. 56)

Specimens examined: Taveuni Island: *S. & T. Pócs 03293/AF.*

Cololejeunea hirta is a tropical Asian and South Pacific species, and has been reported from Vietnam, Peninsular Malaysia, Borneo, Indonesia (Java), New Guinea, Solomon Islands, and Tonga (Tixier 1985) as well as Hawaii (Mizutani 1961). However, Staples & Imada (2007) treated *Cololejeunea hirta* as doubtful for Hawaii.

15. *Cololejeunea huerlimannii* Tixier, Nova Hedwigia 31: 773 (1979)

Type citation: New Caledonia, "Nouvelle Calédonie, Monts Koghis, S.E. du Mont Bouo, épiphylle sur feuilles de palmier, 830 m, 12.11.1950, *Huerlimann 2093* (Holotype). Espèce dédiée au Dr. Huerlimann".

Illustration: Tixier (1979: 774, fig. 29); Tixier (1985: 247, fig. 30).

Specimens examined: Taveuni Island: *S. & T. Pócs 03279/BO.*

Cololejeunea huerlimannii was previously known only from New Caledonia (Miller et al. 1983).

16. *Cololejeunea inflectens* (Mitt.) Benedix, Feddes Repertorium Specierum Novarum Regni Vegetabilis. Beiheft 134: 79 (1953)

Basionym: *Lejeunea inflectens* Mitt., Journal of the Proceedings of the Linnean Society 5: 117. (1861)

Type citation: Sri Lanka, "In insula Ceylon, inter Macromitrias Horton Plains, *Gardner*" (Holotype: NY, isotype: FH).

Illustration: Benedix (1953: 134, pl. 30, as *C. cilitilobula* and *C. peculiaris*).

Specimens examined: Kadavu Island: *S. & T. Pócs 03304/AC, 03309/BE*; Taveuni Island: *S. & T. Pócs 03282/BL, 03289/N, 03296/Z*. Viti Levu Island: *S. & T. Pócs 03276/A T Pócs 08033/G, 08035/L, 08036/R*.

Cololejeunea inflectens was reported by Piippo (1994) as a Paleotropical species , distributed from Madagascar and Seychelles to New Caledonia and Caroline Islands (Miller et al. 1983).

17. ***Cololejeunea kapingaensis*** H.A.Mill., The Bryologist 59: 170 (1956)

Type citation: Caroline Islands, "Werua islet, Kapingamarangi atoll, Caroline Islands, on bark of Pandanus 6 feet above soil level, mixed with other Hepaticae, *W.A. Niering 38*. July 2. 1954. Type specimen in the herbarium of the B. P. Bishop musuem, Honolulu; isotypes in the U. S. National Herbarium, Washington; Conservatoire Botanique, Genève; Dudley Herbarium, Stanford; and the herbarium of the author".

Illustration: Miller (1956: 172, fig. A-L).

Specimens examined: Viti Levu Island: *S. & T. Pócs 03253/W*.

Cololejeunea kapingaensis is a Pacific species, including the Caroline and Marshall islands, and Australia (Pócs & Streimann 2006).

18. ***Cololejeunea kulenensis*** Tixier, Bryophytorum Bibliotheca 27: 71 (1985)

Type citation: Sumatra, "Depok, *leg. K.v. Goebel, n.2*, Feb.1925".

Illustration: Herzog (1932: 95, fig. 2a); Tixier (1985: 32, fig. 56).

Specimens examined: Kadavu Island: *S. & T. Pócs 03304/AB, 03308/H, 03309/BM*. Taveuni Island: *S. & T. Pócs 03295/M*. Viti Levu Island: 5.5 km NW of Suva city limits. Secondary forest over laterite. 19 Sept 1981 *W.R. Buck 7192* (NY) Det B.M. Thiers.

Cololejeunea kulenensis has been reported for Cambodia, Peninsular Malaysia, and Sumatra (cf. ELPT database).

19. ***Cololejeunea lanciloba*** Steph., Hedwigia 34: 250 (1895)

Type citation: India, "Insulae Nicobaricae (Sulp. *Kurz 3917*)"

Illustration: Zhu & So (2001: 278, fig. 106); Daniels, Kariyappa & Daniel (2010: 292-293, figs. 1-35).

Specimens examined: Kadavu Island: *S. & T. Pócs 03301/AE*. Taveuni Island: *S. & T. Pócs 03295/M*. Viti Levu Island: *S. & T. Pócs 03260/M*.

Cololejeunea lanciloba is apparently a widespread paleotropical species (Piippo 1994).

20. ***Cololejeunea latilobula*** (Herzog) Tixier, Bryophytorum Bibliotheca 27: 156 (1985)

Basionym: *Leptocolea latilobula* Herzog in Handel-Mazzetti, Symbolae Sinicae 5: 54 (1930)

Type citation: China [Sichuan], "Lebende Schoepfia jasminodora-Rinde in der wtp St. des mittelchin. Fl. bei Djindjischan nächst Loping, 1600 m. 12. VI. 1917 (10171)"

Illustration: Tixier (1985: 158 fig. 80); Asthana & Srivastava (2003: 105, pl. 21).

Specimens examined: Kadavu Island: *S. & T. Pócs 03301/AE.*

Cololejeunea latilobula was thought to be endemic to the Western Malesian region (Piippo 1994).

21. *Cololejeunea longifolia* (Mitt.) Benedix ex Mizut., Journal of the Hattori Botanical Laboratory 26: 184 (1963)

Basionym: *Lejeunea longifolia* Mitt., Journal of the Proceedings of the Linnean Society 5: 117 (1861)

Type citation: India. Sikkim Himalaya, 4-8000 ft., *J.D. Hooker 1496* (Holotype: NY; isotype: BM, Zhu & So 2001).

Illustration: Zhu & So (2001: 309, fig. 117).

Specimens examined: Viti Levu Island: Naitasiri Prov.: Northern portion of Rairaimatuku Plateau, between Mt Tomanivi and Nasonggo, alt. 870-970 m. Aug-Sept 1947. *A.C. Smith 5760 pp.* (NY) Det. M. Fulford as *Physocolea* (*Cololejeunea*) *leptolejeunoides* Schiffn.

Cololejeunea longifolia was reported by Piippo (1994) as an Asian-Oceanian species.

22. *Cololejeunea paucimarginata* Tixier, Bryophytorum Bibliotheca 27: 100 (1985)

Type citation: Indonesia. "Java, Bogor, épiphylle sur Fougère, 250 m, 13. 4. 1969, *Tixier 4338*". (Holotype, PC), 4339, 4440.

Illustration: Tixier (1985: 100, fig. 48).

Specimens examined: Taveuni Island: *S. & T. Pócs 03298/F.*

Cololejeunea paucimarginata has previously been reported from Java (Tixier 1985). The taxon may be a form of *C. raduliloba* (R.-L. Zhu, pers. comm., in Söderström et al. 2010), but at least based on Fijian specimens, no transitional forms have been observed.

23. *Cololejeunea pseudoserrata* Tixier, Nova Hedwigia 31: 770 (1979)

Type citation: New Caledonia, "Nouvelle Calédonie, Rivière Bleue, 200 m. 24.7.1974. Schmid s.n. (Holotype)".

Illustration: Tixier (1979: 770: fig. 27); Tixier (1985: 283, fig. 52)

Specimens examined: Taveuni Island: *S. & T. Pócs 03279/CA, 03280/CM, 03285/BC, T. Pócs 08012/AD.*

Cololejeunea pseudoserrata has previously been reported from New Caledonia (Miller et al. 1983).

24. *Cololejeunea raduliloba* Steph., Hedwigia 34: 251 (1895)

Type citation: Vietnam. Tonkin. Khang-Thuong (Ma Co), 9 Nov. 1885, *Bon s.n.* Holotype: G-1957 (Zhu & So 2001).

Illustration: Tixier (1985: 105, fig. 51); Zhu (1995: 98); Isono (2009: 45–46, figs 3 & 4).

Specimens examined: Taveuni Island: *S. & T. Pócs 03285/B, 03293/AN.* Viti Levu Island: *S. & T. Pócs 03267/A.*

Cololejeunea raduliloba is a pantropical species with a distribution including, but not limited to the Seychelles, Madagascar, China, Korea, Japan, Vietnam, Borneo, Indonesia, Australia, New Caledonia, and Caroline Is (cf. ELPT database).

25. *Cololejeunea schmidtii* Steph., Botanisk Tidsskrift 24: 278 (1902)

Type citation: Thailand. Koh Chang, Klong Munsé & Nipple, 2000 ft., *Schmidt.* Holotype: G-14217 (Zhu & So 2001).

Illustration: Benedix (1953: 134, pl. 16); Zhu & So (2001: 334, fig. 125).

Specimens examined: Taveuni Island: *S. & T. Pócs 03279/AW, 03280/CD, 03288/CV, 03289/CW.* Viti Levu Island: *S. & T. Pócs 032069/K, 03273/CH, 03274/BB.*

Cololejeunea schmidtii is a Southeast Asiatic species distributed from Sri Lanka to Japan and Papua New Guinea (Pócs & Streimann 2006).

26. *Cololejeunea sintenisii* (Steph.) Pócs, in Dauphin et al., Cryptogamie, Bryologie 29: 235. 2008

Basionym: *Aphanolejeunea sintenisii* Steph., Species Hepaticarum 5: 861 (1916)

Type citation: Puerto Rico, "Sintenis No. 136".

Illustration: Schuster (1980: 1304, fig. 771, as *Aphanolejeunea ephemeroides*; Allorge & Jovet-Ast (1950: 21, figs 1 & 2, as *Aphanolejeunea teotonii*).

Specimens examined: Viti Levu Island: *T. Pócs 08036/H.*

Cololejeunea sintenisii is a pantropical species (Pócs & Bernecker 2009).

27. *Cololejeunea societatis* Tixier, Bauhinia 8: 230 (1987)

Type citation: Tahiti, "T 1182 a (Holotypus PC, isotypus Hb. Hürlimann Basel) epiphyll an Strauch nahe der Wasserfassung ob der landwirtschftlichen Versuchsstation auf der Halbinsel Taiarapu. 13. II. 1952, leg H[ans] H[ürlimann]".

Illustration: Hürlimann (1987: 231, fig. 4).

Specimens examined: Taveuni Island: *S. & T. Pócs 03289/BJ, BO.*

Cololejeunea societatis has previously only been reported for Society Is (cf. ELPT database).

28. *Cololejeunea stylosa* (Steph.) Steph. ex Mizut., Journal of the Hattori Botanical Laboratory 28: 109 (1965)

Basionym: *Lejeunea stylosa* Steph., Hedwigia 27: 289 (1888)

Type citation: Philippines, "Insula Luzon, *leg. Micholitz*, 1886".

Illustration: Zhu & So (2001: 271, fig. 104).

Specimens examined: Viti Levu Island: *S. & T. Pócs 03252/BD, 03276/H.*

Cololejeunea stylosa has been recorded from China, Japan, Nansei-Shoto (Ryu-Kyu Is), Taiwan, Ogasawara-shoto (Bonin), Kazan-retto (Volcano), Thailand, Laos, Vietnam,

Cambodia, Peninsular Malaysia, Philippines, Queensland, and Mariana Is (cf. ELPT database).

29. ***Cololejeunea tridentata*** Tixier, Bryophytorum Bibliotheca 27: 83 (1985)

Type citation: Malaysia, "Johore, Mont Ophir, épiphylle dans les brousses au bord du lac de retenue, 300 m, 20. 4. 1972, *Tixier 6255* (Holotype, PC)".

Illustration: Tixier (1985: 83, fig. 39).

Specimens examined: Taveuni Island: *S. & T. Pócs 03288/CX.*

Cololejeunea tridentata was previously known from Borneo and Malaysia (Eggers et al. 1998).

30. ***Cololejeunea wightii*** Steph., Hedwigia 34: 253 (1895)

Type citation: [Malaya] Pulo Penang, s. d., *Wallich s. n.*, ex hb Schiffner in hb G. Holotype: G-22054 (Zhu & So 1999b).

Illustration: Miller (1968: 254, fig. 37); Tixier (1979: 759, fig. 20 as *Cololejeunea cuspidata* Steph.); Tixier (1985: 249, fig. 31 as *C. wightii*; 1985: 250, fig. 32 as *C. cuspidata*); Thiers (1988: 136, pl. 9), Zhu & So (1999: 169, fig. 3); Miller et al. (1963a: pl. 21).

Specimens examined: Kadavu Island: *S. & T. Pócs 03300/J, 03306/C.* Taveuni Island: *S. & T. Pócs 0303291/B, 03292/G, 03293/D.* Viti Levu Island: *S. & T. Pócs 03252/W.*

Cololejeunea wightii has a Pantropical distribution (Zhu & So 1999), with reports from Seychelles, China, ?India, Thailand, Cambodia, Peninsular Malaysia, New Guinea, Queensland, Norfolk I, New Caledonia, Tonga, Samoa, and Caroline Is (cf. ELPT database).

31. ***Colura brevistyla*** **Herzog,** Beihefte zum Botanischen Centralblatt 38: 331 (1921) **Fig. 1c & 2a,b**

Type citation: Sri Lanka, "Ceylon: ohne näheren Fundortsvermerk, leg. Herzog II. 1906".

Illustration: Jovet-Ast (1953: 277, fig. 47).

Specimens examined: Viti Levu Island: *T Pócs 08032/C, 08034/N, 08036/G, V.* Taveuni Island: *S. & T. Pócs 03288/BE.*

Colura brevistyla has been reported from Sri Lanka, Vietnam Philippines, and the Mariana Islands (cf. ELPT database). The specimens from Fiji have stronger lobe dentition than the type.

32. ***Colura tenuicornis*** (A.Evans) Steph., Species Hepaticarum 5: 942 (1916) **Fig. 2c**

Basionym: *Colurolejeunea tenuicornis* A.Evans, Transactions of the Connecticut Academy of Arts and Sciences 10: 455 (1900)

Type citation: Hawaii. Oahu. Nuuanu (Cooke), on leaves of a fern, *A. W. Evans s.n.* & s.d. Holotype: YU. (Zhu & So 2001).

Illustration: Jovet-Ast (1953: 249, fig. 30); Zhu & So (2001: 234, fig. 89).

Specimens examined: Viti Levu Island: *T. Pócs 08023/AA.*

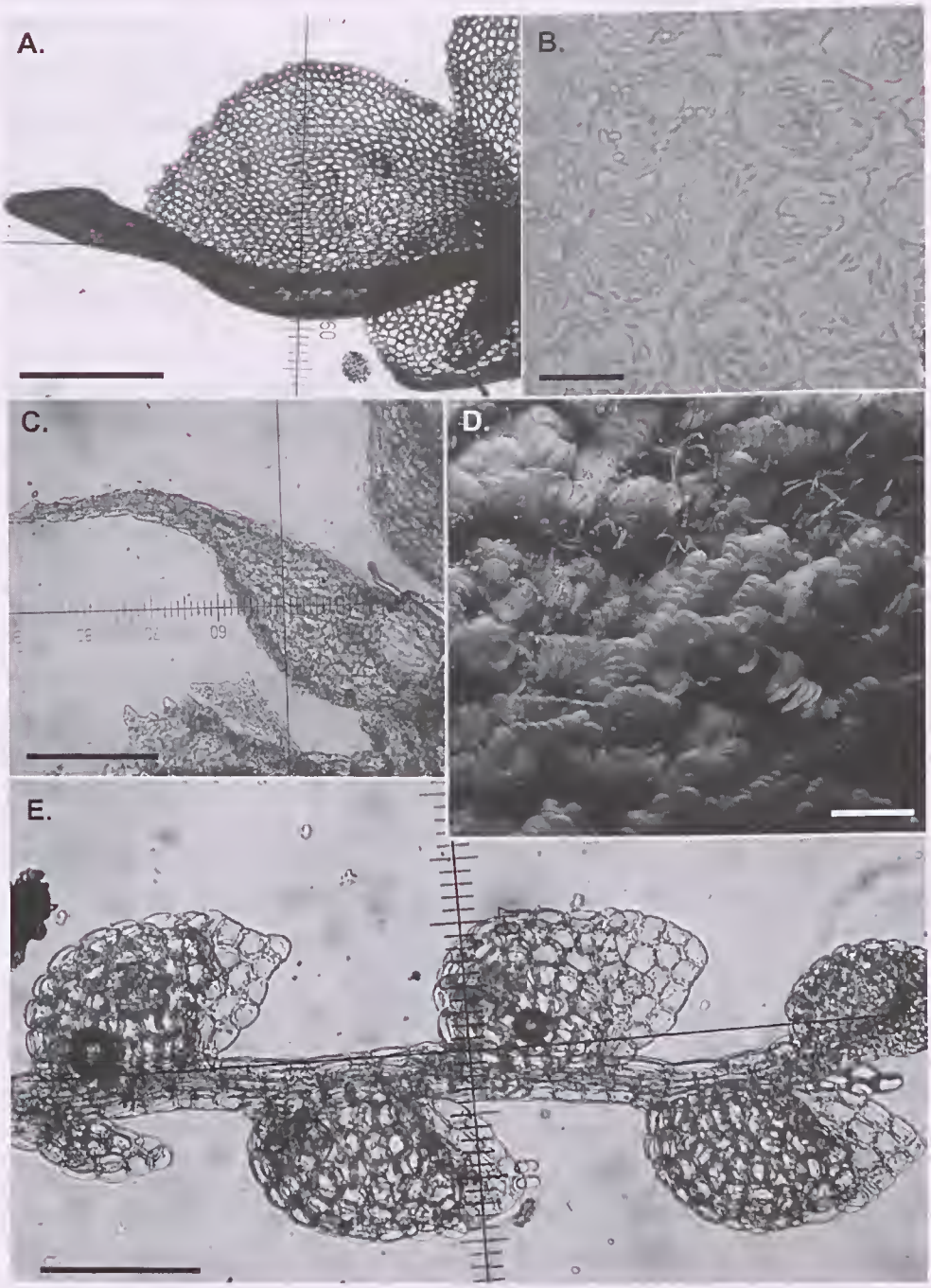

Fig. 2. A, B, *Colura brevistyla* (*T. Pócs 08036/V*). **A,** ventral lobe, scale bar 500 µm; **B,** oil bodies and cell anatomy, scale bar 20 µm; **C,** *Colura tenuicornis*, lobe and lobule (*S. & T. Pócs 03274/AO*), scale bar 500 µm; **D,** *Phaeolejeunea inermis*, habit on decaying wood (*S. & T. Pócs 03300/AG*), scale bar 2 mm; **E,** *Lejeunea exilis*, ventral view (*S. & T. Pócs 03289/BY*), scale bar 100 µm.

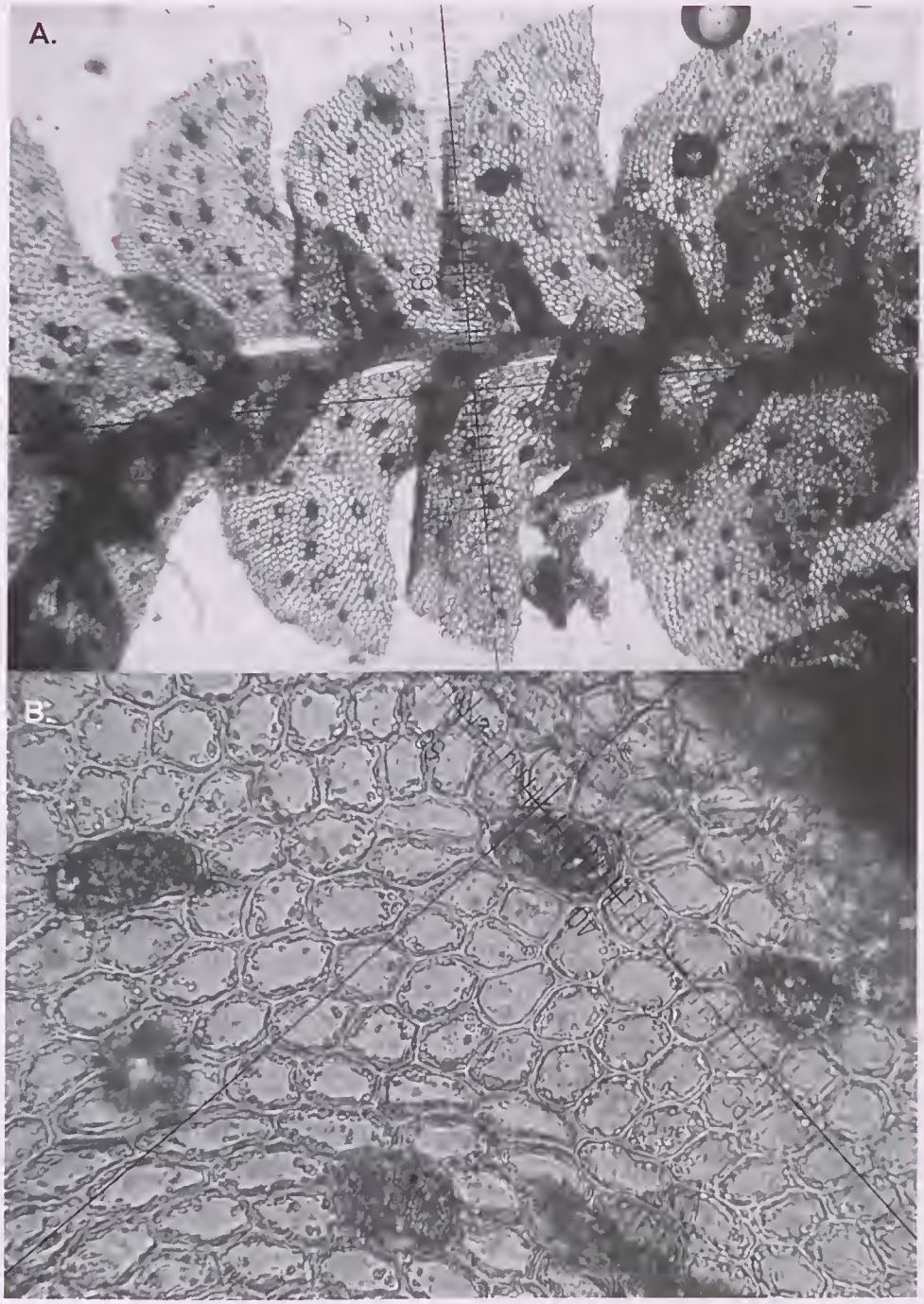

Fig. 3. A, B, *Drepanolejeunea tricornua*, (*S. & T. Pócs 03280/BT*). **A,** ventral view; **B,** median cells of leaf lobe.

Colura tenuicornis was reported by Piippo (1994) to be a Paleotropical species, excluding Australia.

33. *Drepanolejeunea tricornua* Herzog, Annales Bryologici 9: 124 (1936) **Fig. 3a,b**

Type citation: Indonesia. Seram, "S.O. Ceram. auf Oldenhamia auriculata, bei Wai Tok. 0-100 m, *Kornassie no. 1055/a*, 27.II.18 (Herb., H. B. Bog. no 4323)".

Illustration: Herzog (1936: 124, fig. 6); Mizutani (1990: 371, fig.2).

Specimen examined: Taveuni Island: *S. & T. Pócs 03280/BS & BT.*

Drepanolejeunea tricornua has been recorded from Borneo, Java, Seram and New Guinea (Mizutani 1990).

34. *Kurzia gonyotricha* (Sande Lac.) Grolle, Revue Bryologique et Lichénologique 32: 167 (1964)

Basionym: *Lepidozia gonyotricha* Sande Lac. Nederlandsch Kruidkundig Archief. Verslangen en Mededelingen der Nederlandsche Botanische Vereeniging 3: 521 (1851)

Type citation: Indonesia. Java, leg. *Junghuhn*. Source: IH online.

Illustration: Piippo (1985 177, fig 5f).

Specimen examined: Vanua Levu Island: Waisali Dakua National Trust Forest Reserve. On dead rotting log and humus at track margin, with *Telaranea* and *Bazzania*. *M. von Konrat, J. E. Braggins, & A. Naikatini 06/8-8(1a). July 2006.* Det. E. Brown.

Kurzia gonyotricha has been reported from Japan, Ryukyu, Taiwan, China (8 provinces), Thailand, Peninsular Malaysia, Sumatra, Java, Borneo, Sulawesi, Moluccas, Philippines, New Guinea, and New Caledonia (cf. ELPT database).

35. *Lejeunea alata* Gottsche, Synopsis Hepaticarum 3: 406 (1845)

Type citation: Lectotype ("Grolle 1977; der Holotypus ist in B verbrannt"): Maskarenen, ‚in Memecylo cordato; Sieber, Fl. Mixt. [Exs.] no. 170, a cl. Sonder illatum', STR. Isolectotype Grolle 1977): G-17836, S, W (Lindenb. Hep. 6876).

Illustration: Zhu & So (2001: 138, fig. 53).

Specimens examined: Taveuni Island: *S. & T. Pócs 03280/CS.* Viti Levu Island: *S. & T. Pócs 03273/R.*

Lejeunea alata has been recorded from Africa: Tanzania and Indian Ocean Islands; S-China, Vietnam, Malaysia, Java, Sumatra, New Guinea, Samoa, and Polynesia (mostly after Zhu & So 2001).

36. *Lejeunea anisophylla* Mont., Annales des Sciences Naturelles; Botanique, sér. 2 19: 263 (1843)

Type citation: Hawaii. "ad cortices inter uscos in insulis Sandwich". Gaudichaud s.n. & s.d. Holotype: PC, Isotypes: BM, G (Zhu & So 2001).

Illustration: Jones (1972: 38-39 as *L. caespitosa*); Zhu & So (2001: 157 fig. 62).

Selected specimens examined: Kadavu Island: *S. & T. Pócs 03301/AL.* Taveuni Island: *T Pócs 08021/H.* Viti Levu Island: *S. & T. Pócs 03252/Y*

In Fiji, the species is very widespread, with more than 60 specimens collected on Kadavu, Taveuni, and Viti Levu on very different substrates. *Lejeunea anisophylla* is a Palaeotropic species common in Africa (Pócs 2010), tropical and subtropical Asia, Australia and Oceania eastwards to Tahiti and Hawaii (Zhu & So 2001).

37. *Lejeunea apiculata* Sande Lac., in Dozy (ed.), Nederlandsch Kruidkundig Archief. Verslagen en Mededelingen der Nederlandsche Botanische Vereeniging 3: 421 (1854) [1855]

Synonym: *Stenolejeunea apiculata* (Sande Lac) R.M.Schust. Beihefte zur Nova Hedwigia 9: 144. 1963

Type citation: Indonesia. Java, "Javam. TEYSM. in Herb. Dz. et Mb. In monte Salak. ZOLLINGER coll. sub n. 3560. Herb. JUNGH".

Illustration: Eifrig (1937: 100, fig. XII/2 as *Taxilejeunea apiculata*).

Specimens examined: Viti Levu Island: *S. & T. Pócs 03274/BQ, BV.*

Lejeunea apiculata has been recorded from Shaanxi, Shanxi, Guangdong, Hong Kong, Hainan, Japan, Nansei-Shoto (Ryu-Kyu Is), Taiwan, Sri Lanka, Vietnam, Cambodia, Nicobar Is, Sumatra, Borneo, Philippines, Sulawesi, Java, Australia (Queensland), and New Caledonia (cf. ELPT database).

38. *Lejeunea cocoes* Mitt., Journal of the Proceedings of the Linnean Society. Botany 5: 114. (1860) [1861]

Type citation: Sri Lanka, "Ad truncos Cocoes nuciferae, Balagom, Ceylon, *Gardner* (*No. 1499*)".

Illustration: Mizutani 1963: 177, fig s 10-18.

Specimens examined: Viti Levu Island: *S. & T. Pócs 03255/A, 03259/Z.* Taveuni Island: *S. & T. Pócs 03283/T, 03285/BK, 03287/B, 03293/U,03294/C.* Kadavu Island: *S. & T. Pócs 03300/G, 03308/D.*

Lejeunea cocoes is known from Diego Garcia, Chagos, Sri Lanka, S-India, S-China, Java, and Sarawak. The species is a new record for the Pacific.

39. *Lejeunea exilis* (Reinw., Blume et Nees) Grolle, Journal of the Hattori Botanical Laboratory 46: 353 (1979) **Fig. 2e**

Basionym: *Jungermannia exilis* Reinw., Blume et Nees, Nova Acta Physico-Medica Academiae Caesareae Leopoldino-Carolinae Naturae Curiosorum Exhibentia Ephemerides sive Observationes Historias et Experimenta 12: 227 (1824) [1825]

Type citation: Indonesia. Java (Neotype designated by Bischler et al. 1962: STR sub. *Microlejeunea erectifolia*, isoneotype: W Lindenb. Hep. 6724 p.p. sub. *Microlejeunea cucullata*, PC-Mont., S) (Grolle 1979).

Synonym: *Lejeunea microstipula* Steph. Hedwigia 29: 89, 139, XVI (1890) "*Micro-Lejeunea*" **syn. nov.**

Type citation: Indonesia. Java, hb. Lindenberg n. 6721.

Grolle (1980) in his account on the liverworts of Samoa reported *Lejeunea microstipula* Steph. from Upolu Island, based on a specimen collected by Schultze-Motel 3640 and

3760/b and stated that *L. microstipula* belonged to subgen. *Byssolejeunea*, along with its closest relative, *Lejeunea exilis*, of which differs only by its acute leaf lobe. Zhu & Grolle (2003) in their detailed study on *Lejeunea exilis* described the species having very variable leaf lobes, i.e. "leaf lobes ovate, ovate-lanceolate or irregularly triangular-ovate" with "apex acute, short acuminate, rounded, obtuse, rounded-obtuse, or obtuse-acute, flat, rarely incurved". This variability was also illustrated in their figures, where the lobe apex varied from acute through triangular-obtuse to rounded, even within the same plant. The same variability was illustrated by Stepani in his Icones (Stephani 1985: 007759, 007760), where the type of *Lejeunea microstipula* has an acute lobe while another specimen collected by Paterson has ovate lobes with a rounded apex. This variability can be observed with Fijian specimens, therefore we believe the two taxa cannot be treated as separate species.

Illustration: Zhu & Grolle (2003: 103,104, figs. 1, 2).

Specimens examined: Taveuni Island: *S. & T. Pócs 03269/P, 03273/CR, 03278/M, 03280/CO, 03286/AT, 03288/AD, 03289/BY, 03290/BA, T. Pócs 08013/AH*. Viti Levu Island: *S. & T. Pócs 03271/AF, 03272/B, 03273/AG, 03274/AB, AN, 08029/C pp, 08029/O*.

Lejeunea exilis was reported by Piippo (1994) as an Asian-Oceanian species; with records from Réunion, Shaanxi, Anhui, Taiwan, Ogasawara-shoto (Bonin), Kazan-retto (Volcano), India, Vietnam, Peninsular Malaysia, Sumatra, Borneo, Philippines, Moluccas, Java, New Guinea, Australia, Society Is, Caroline Is, and Mariana Is. (cf. ELPT database). Grolle (1980) recorded *Lejeunea exilis* for Samoa as *Lejeunea microstipula* Steph.

40. *Lepidolejeunea borneensis* (Steph.) R.M.Schust., Phytologia 45: 425 (1980)

Basionym: *Hygrolejeunea borneensis* Steph., Species Hepaticarum 5: 557 (1914)

Type citation: Indonesia, "Borneo occidentalis".

Illustration: Piippo (1986: 37, fig. 10).

Specimens examined: Viti Levu Island: *T Pócs 08036/JB, AA*. Taveuni Island: *S. & T. Pócs 08036/JB, AA*.

Lepidolejeunea borneensis has previously been reported for Malay Peninsula, Borneo, and Caroline Is (cf. ELPT database).

41. *Lopholejeunea hispidissima* Steph., Species Hepaticarum 5: 80 (1912)

Type citation: New Caledonia. *Franc* s.n. Holotype: G, Isotype: FH (Thiers & Gradstein 1989).

Illustration: Thiers & Gradstein (1989: 29, fig. 9).

Specimens examined: Taveuni Island: *S. & T. Pócs 03292/K*. Viti Levu Island: *S. & T. Pócs 03263/G*. Det. A. Sass-Gyarmati.

Lopholejeunea hispidissima has been reported for Australia (Queensland), New Caledonia, and Vanuatu (Sass-Gyarmati 2002).

42. *Microlejeunea lunulatiloba* Horik., Journal of Science of Hiroshima University, Series B, Division 2 (Botany) 1: 27 (1931)

Type citation: Bonin Islands [Ogasawara Gunto] "Bonin: Insl. Chichijima (*Y. Horikawa, no. 1962b-type*,... July 1930)". Source: IH online.

Illustration: Miller et al. (1963b, pl. 131 f–l).

Specimens examined: Viti Levu Island: *S. & T. Pócs 03259/AA.*

Microlejeunea lunulatiloba is a Pacific species known from the Bonin, Caroline, Marshall, Mariana and Hawaiian islands (Miller et al. 1963a, Miller et al. 1983).

43. *Mnioloma novaezelandiae* J.J.Engel, Cryptogamie, Bryologie 27: 111 (2006)

Type citation: New Zealand, South Island, Southland Land District, Fiordland Natl. Park, Charles Sound, south side of Gold Arm, 340 m, 8 April 2002, *Renner CMS J156 T/10* (Holotype, F; Isotypes, AK, CHR) (Engel 2006).

Illustration: Engel & Glenny (2008: 540, fig. 123).

Specimens examined: Viti Levu Island: *T. Pócs 08028/F.*

Mnioloma novaezelandiae has previously only been recorded from New Zealand. A report for Queensland by Renner & Braggins (2006) was based on an erroneous identification (Renner & Brown 2008), referring it to *Mnioloma* cf. *fuscum*. It is apparent that the complex needs revision in Australasia and Oceania.

44. *Phaeolejeunea inermis* (Steph.) Mizut., Journal of the Hattori Botanical Laboratory 31: 134 (1968) **Fig. 2d**

Basionym: *Lopholejeunea inermis* Steph., Species Hepaticarum 5: 92 (1912)

Type citation: Papua New Guinea. Milne Bay Prov.: Samarai, *Fitzgerald s.n.* Holotype: G-12642 (Gradstein et al. 2002).

Illustration: Mizutani (1968: XX, Fig II); Mizutani (1968: 133, fig.II/9–15).

Specimens examined: Kadavu Island: *S. & T. Pócs 03300/AG.*

Phaeolejeunea inermis was previously known only from the type collected in Papua New Guinea (Mizutani 1968, Gradstein et al. 2002). Mizutani suggested, based on the scanty type specimen, that it is a poorly developed form of *P. latistipula* (Schiffn.) Mizut. However, the abundant material from Fiji, with seemingly stable characters, supports the independent identity of *P. inermis.*

45. *Plagiochila bicoruuta* Steph., Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 23: 305 (1897)

Type citation: Samoa. *R[einecke] 55.* Holotype: G (So 2000).

Illustration: So (2000: 227, fig. 2).

Specimens examined: Taveuni Island: *T. Pócs 08013/AE.*

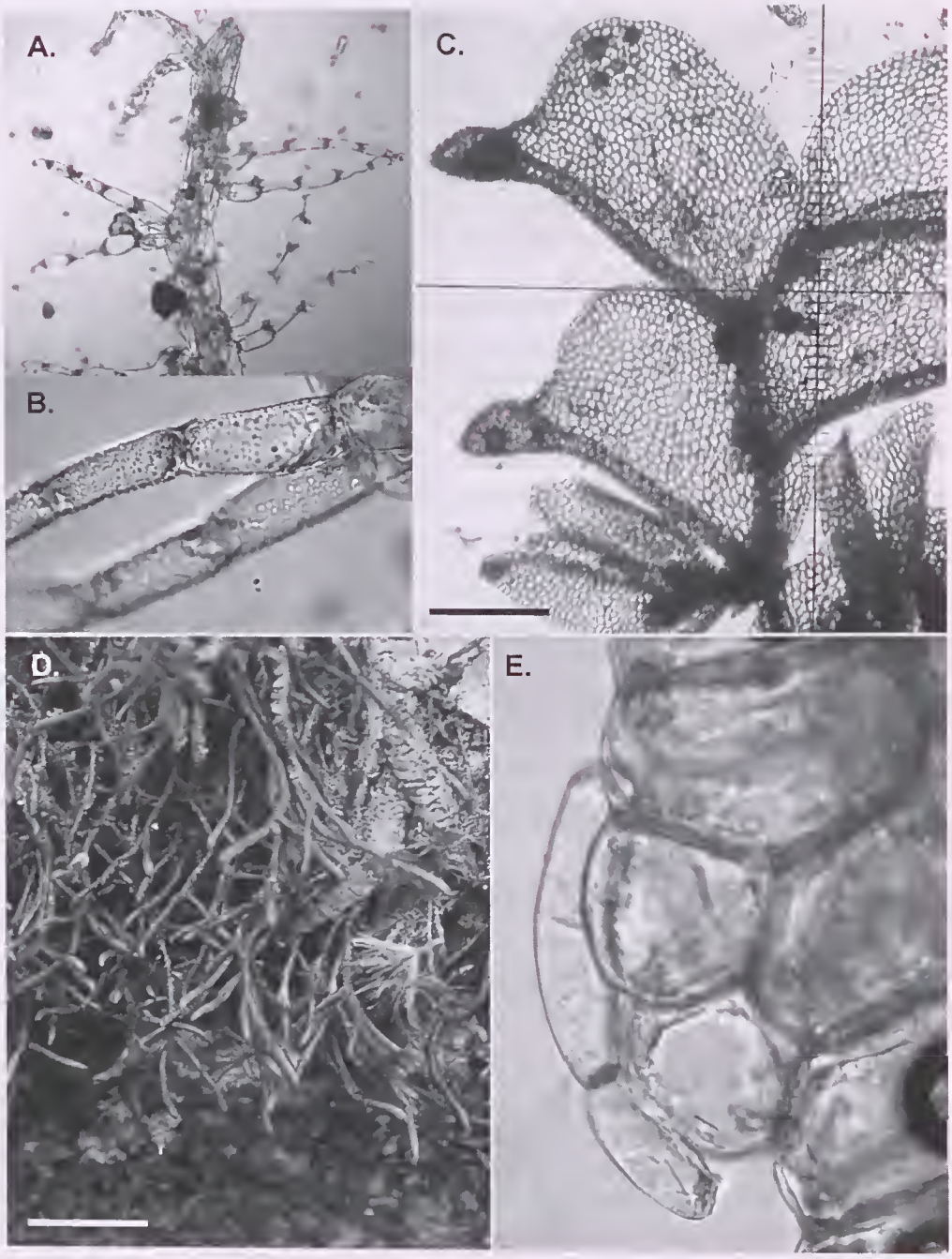

Fig. 4. A, B, *Telaranea rosarioana* (*M. von Konrat, J. E. Braggins & A. Naikatini* 06/7–13). **A,** habit with deeply bilobed leaves, **B,** cuticle conspicuously papillose; **C,** *Colura acroloba*, (*S. & T. Pócs 03261/BO*), scale bar250 µm; **D,** *Cheilolejeunea trifaria*, habit on bark (*S. & T. Pócs 03307/DB*), scale bar 1 cm. **E,** *Zoopsis liukiuensis* (*M. von Konrat, J. E. Braggins, & A. Naikatini 06/8-8(1a).*

Plagiochila bicornuta has been recorded from Borneo, Philippines, Moluccas, Java, New Guinea, New Caledonia, Vanuatu, Samoa, and Caroline Is (cf. ELPT database).

46. *Pleurozia conchifolia* (Hook. et Arn.) Austin, Bulletin of the Torrey Botanical Club 5: 16 (1874)

Basionym: *Jungermannia conchifolia* Hook. et Arn., The Botany of Captain Beechey's Voyage: 110 (1832)

Type citation: Sandwich Is. 1826, *Beechey* (Holotype: BM, Isotypes: BM, FH, H, NY, PC) (Thiers 1993).

P. conchifolia* var. *conchifolia **Fig. 1c**

Illustration: Thiers (1993: 527, figs. 14-18).

Specimens examined: Taveuni Island: *S. & T. Pócs 03279/N.*

Pleurozia conchifolia var. conchifolia has been recorded from Burma (Myanmar), Malay Peninsula, Sumatra, Borneo, Sulawesi, Moluccas, New Guinea, Solomon Islands, and Hawaii (cf. ELPT database).

47. *Telaranea rosarioana* H.A.Mill., Journal of Bryology 14: 240 (1986) **Fig. 4a,b**

Type citation: Vanuatu. "Espiritu Santo Island, summit of Mt Patliu above Narango, 25 July 1984. H. A. Miller 15993 in admixture with Symphyogyna and Leucophanes (paratype)".

Illustration: Miller (1986: 241, fig.4).

Specimens examined: Viti Levu: Rairaimatuku Plateau, on a summit with disturbed stunted forest with a telecommunication tower, ca. 15 km S of Monasavu Dam, at 1260 m, S 17°47'31", E 178°01'13.9", on very old, rotted tree fern trunk, *M. von Konrat, J. Braggins & A. Naikatini 06/7-13*, July 2006. Det. M. von Konrat & T. Pócs.

Telaranea rosarioana was previously known only from the type locality in Vanuatu (Engel & Smith Merrill 2004). Engel & Smith Merrill (2004) mistakenly stated that this taxon was endemic to Fiji.

48. *Zoopsis liukiuensis* Horik., Journal of Science of Hiroshima University, Series B, Division 2 (Botany) 1: 65 (1931) **Fig. 4e**

Type citation: Japan. Liukiu, Okinawa, *Horikawa 2620.* Source: IH online.

Illustration: Schuster (2000: 406–407, figs. 168-169).

Specimens examined: Vanua Levu Island: Waisali Dakua National Trust Forest Reserve. On dead rotting log and humus at track margin, with *Telaranea* and *Bazzania. M. von Konrat, J. E. Braggins & A. Naikatini 06/8-8(1a).* July 2006. Det. M. von Konrat & J. Braggins. Viti Levu Island: on the ridge of Rairaimatuku Plateau, ca. 2 km E of Monasavu Dam, on the SW side of a summit at 1050–1070 m alt. S 17°45'21", E 178°04'09 ". Shady, very wet stunted forest dominated by *Dicksonia brackenridgei.* On dead decaying matter at base of tree. *M. von Konrat with T. Pócs, J. Braggins, E. Brown, M. Renner & A. Naikatini 08/2–18,* 16 Apr. 2008, Det. M. von Konrat & J. Braggins.

Zoopsis liukiuensis is known from S Japan, S China, Philippines, Malay Peninsula, Sumatra, Java, Borneo, New Guinea, Queensland, Vanuatu, and Samoa (Piippo 1984).

Extended distribution records

Distribution is extended by reporting new islands within Fiji for the following 39 taxa.

49. *Acrolejeunea pycnoclada* (Taylor) Schiffn., in Engler & Prantl, Die natürlichen Pflanzenfamilien 1(3): 128 (1895)

Basionym: *Ptychanthus pycnocladus* Taylor, London Journal of Botany 5: 385 (1846)

Type citation: Malaysia, "On bark. Malacca. Hook. Herb.".

Acrolejeunea pycnoclada subsp. ***pycnoclada***

Illustration: Gradstein et al. (2002: 8, fig. 3).

Specimens examined: Kadavu Island: *S. & T. Pócs 03300/U, TA.*

Acrolejeunea pycnoclada subsp. *pycnoclada* is a new report for the island of Kadavu. This species has a paleotropical distribution (Piippo 1994). Det. A. Sass-Gyarmati.

50. *Archilejeunea planiuscula* (Mitt.) Steph., Species Hepaticarum 4: 731 (1911)

Basionym: *Lejeunea planiuscula* Mitt., Journal of the Proceedings of the Linnean Society. Botany 5: 111 (1860) [1861]

Type citation: Burma, "Pegu ad Rangoon, inter L. ungulatae et Meteorii squarrosi caespites, *M'Clelland*".

Illustration: Thiers & Gradstein (1989: 9, fig. 1; Gradstein et al. (2002: 12, fig. 5).

Specimens examined: Kadavu Island: *S. & T. Pócs 03310/D.* Taveuni Island: *S. & T. Pócs 03282/P.* Det. A. Sass-Gyarmati.

Archilejeunea planiuscula is a new report for the islands of Kadavu and Taveuni. This species is known from many localities in the Indo-Pacific region (Sass-Gyarmati 2003).

51. *Caudalejeunea reniloba* (Gottsche) Steph., Species Hepaticarum 5: 16 (1912)

Basionym: *Phragmicoma reniloba* Gottsche, Synopsis Hepaticarum 3: 301 (1845).

Type citation: Indonesia, Java, Banten, *Blume s.n.* (G, lectotype designated by Thiers & Gradstein 1989).

Illustration: Gradstein et al. (2002: 19, fig. 9).

Specimens examined: Taveuni Island: *S. & T. Pócs 03288/F, BP.* Det. A. Sass-Gyarmati.

Caudalejeunea reniloba is a new report for the island of Taveuni. It is widespread in tropical regions, including Oceania and Asia (Zhu & So 2001) Philippines, New Guinea, Indonesia, Oceania, Mascarenes, and Australia (northern Queensland) Sass-Gyarmati (2002).

52. *Ceratolejeunea belangeriana* (Gottsche) Steph., Species Hepaticarum 5: 396 (1913)

Basionym: *Lejeunea belangeriana* Gottsche, Synopsis Hepaticarum 3: 398 (1845)

Type citation: Mauritius, "Insula Franciae (*Belanger* in Hb L.)".

Illustration: Bonner (1953: 169, fig. 8).

Specimens examined: Kadavu Island: *S. & T. Pócs 03300/AP.*

Ceratolejeunea belangeriana is a new report for the island of Kadavu. This species has a paleotropical distribution (Piippo 1994).

53. *Cheilolejeunea ceylanica* (Gottsche) R.M.Schust. et Kachroo in Kachroo & Schuster, Journal of the Linnean Society. Botany 56: 509 (1961)

Basionym: *Lejeunea ceylanica* Gottsche, Synopsis Hepaticarum 3: 359 (1845)

Type citation: Sri Lanka, "Insula Ceylon. Inter Radulam javanicam cum Lej. Lindenbergii (ex Hb. Hk.) inveni".

Illustration: Zhu & So (2001: 118, fig. 47).

Specimens examined: Taveuni Island: *S. & T. Pócs 03288/DQ.* Kadavu Island: *S. & T. 03304/K.*

Cheilolejeunea ceylanica is a new report for the islands of Taveuni and Kadavu. This species has a paleotropical distribution (Piippo 1994).

54. *Cheilolejeunea intertexta* (Lindenb.) Steph., Bulletin de l'Herbier Boissier, sér. 1 5: 79 (1897)

Basionym: *Lejeunea intertexta* Lindenb., Synopsis Hepaticarum 3: 379 (1845)

Type citation: Karolinen "in Ualan, Ulleay et Lugnor Insul. Carol." *leg. Mertens*, Lindenb. hep. 6653/a, c. per + ♂ (Lectotype: W, designated by Grolle 1979).

Illustration: Mizutani (1982: 171, fig. 9).

Specimens examined: Kadavu Island: *S. & T. Pócs 03303/A.* Taveuni Island: *S. & T. Pócs 03276/C, 03283/L, 03285/E, 03287/A, C, E, 03294/E.*

Cheilolejeunea intertexta is a new report for the island of Kadavu. This species has a paleotropical distribution (Piippo 1994).

55. *Cheilolejeunea trapezia* (Nees) R.M.Schust. et Kachroo, Journal of the Hattori Botanical Laboratory 24: 282 (1961)

Basionym: *Jungermannia trapezia* Nees, Enumeratio Plantarum Cryptogamicarum Javae: 41 (1830)

Type citation: Indonesia. Java, "in Collemate bullato semel inventa, absque fructificatione".

Illustration: Mizutani (1980: 328, fig. 5 as *C. longiloba*); Zhu & So (2001: 120, fig. 48, as *C. imbricata*); Stephani (1985: 001792) (as *Cheilolejeunea inaequitexta*).

Specimens examined: Taveuni Island: *S. & T. Pócs 03293/V.* Kadavu Island: *S. & T. Pócs 03293/V.*

Zhu & Grolle (2004) studied *Cheilolejeunea trapezia* in detail, noting that it was the correct name for a species commonly referred to as *C. imbricata* (Nees) S.Hatt. Zhu et al. (2002) stated that *C. longiloba* Steph. ex G. Hoffm. is also synonym of *C. trapezia*. Zhu & Grolle (2004) stated C. *trapezia* was a highly variable species and noted its main characters. It is a widely distributed in tropical and subtropical regions in Asia and Oceania. *Cheilolejeunea trapezia* is a new report for the islands of Taveuni and Kadavu.

56. *Cheilolejeunea trifaria* (Reinw., Blume et Nees) Mizut., Journal of the Hattori Botanical Laboratory 27: 132 (1964) **Fig. 4d**

Basionym: *Jungermannia trifaria* Reinw., Blume et Nees, Nova Acta Physico-Medica Academiae Caesareae Leopoldino-Carolinae Naturae Curiosorum Exhibentia Ephemerides sive Observationes Historias et Experimenta 12: 226 (1825)

Type citation: Indonesia. Java, "ad terrram. caespitosa. *Blume.* V. c. cal.".

Illustration: Mizutani (1982: 169, fig. 8).

Specimen examined: Kadavu Island: *03305/C, 03300/AU, 03307/K, DB.*

Cheilolejeunea trifaria is a new report for the island of Kadavu. This species is widely distributed from tropical Africa to the Indomalesian and Australasian regions. Piippo (1994) noted the taxon as a transpacific species.

57. *Cololejeunea ceatocarpa* (Ångstr.) Steph., Bulletin de l'Herbier Boissier, sér. 1 5: 842 (1897)

Basionym: *Lejeunea ceatocarpa* Ångstr., Öfversigt af Förhandlingar: Kongl. Svenska Vetenskaps-Akademien 29(4): 27 (1872) [1873]

Type citation: Hawaii. Honolulu, "in caulibus foliisque Cryptopodii bartramioides".

Illustration: Tixier (1985: 269, fig. 44).

Specimens examined: Taveuni Island: *S. & T. Pócs 03284/L.*

Cololejeunea ceatocarpa is a new report for the island of Taveuni. Recorded elsewhere from Réunion, Bangladesh, Vietnam, New Caledonia, Fiji, Tonga, and Hawaii (cf. ELPT database).

58. *Cololejeunea cordiflora* Steph., Hedwigia 34: 246 (1895)

Type citation: New Caledonia, "(*Balansa 3694*) Herb. Bescherelle".

Illustration: Zhu & So (2001: 242, fig. 93).

Specimens examined: Taveuni Island: *S. & T. Pócs 03279/AZ, 03281/AB, 03282/BB, 03285/BA, 03286/AF, 03288/CU, CK.* Viti Levu Island: *S. & T. Pócs 03252/BK, 03256/O, 03258/E, 03261/BM, BN.*

Cololejeunea cordiflora is a new report for the islands of Taveuni and Viti Levu. The species is possibly new to Fiji Islands, although probably all previous records of *C. goebelii* refer to this species, see comments by Pócs & Piippo (2011).

59. *Cololejeunea haskarliana* (Lehm. & Lindenb.) Schiffn., Conspectus Hepaticarum Archipelagi Indici: 244 (1898)

Basionym: *Lejeunea haskarliana* Lehm. & Lindenb. Novarum et Minus Cognitarum Stirpium Pugillus 8: 26. 1844.

Type citation: Java, "Java insula, ubi in aliis Jumngermanniis repentem *legit cl. Haskarl*".

Cololejeunea haskarliana* var. *haskarliana

Illustration: Benedix (1953: 134, t.18, 19a-b); Zhu & So (2001: 323, fig. 121).

Specimens examined: Taveuni Island: *S. & T. Pócs 03279/BD, BE, BY.*

Cololejeunea haskarliana var. *haskarliana* is a new report for the island of Taveuni. *Cololejeunea haskarliana* is distributed from the Seychelles and India to Japan, Australia and to New Caledonia (Pócs & Streimann 2006).

60. *Cololejeunea obliqua* (Nees et Mont.) Schiffn., Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 23: 586 (1897)

Basionym: *Lejeunea obliqua* Nees et Mont., Annales des Sciences Naturelles; Botanique, sér. 2 19: 264 (1843)

Type citation: French Guyana, "[cum L. oxyphylla] in foliis circa Cayennam á cl. Leprieur lecta".

Illustration: Tixier (1985: 293, fig. 57, as *C. scabriflora*).

Species examined: Taveuni Island: *03279/AX, 03288/BNB, BC.*

Cololejeunea obliqua is a new report for the island of Taveuni. This is a widespread pantropical species (Zhu & So 2001).

61. *Colura acroloba* (Mont. ex Steph.) Ast, Revue Bryologique et Lichénologique 22: 297 (1953)

Basionym: *Lejeunea acroloba* Mont. ex Steph., Hedwigia 29: 97 (1890)

Type citation: Philippines [Luzon]. "Manila". Collector unknown. Holotype: W (Lindenb. Hepat. 6872) Lindenberg. (Zhu & So 2001).

Illustration: Zhu & So (2001: 230, fig. 88).

Specimens examined: Viti Levu Island: *S. & T. Pócs 03261,BK, BO.*

Colura acroloba is a new report for the island of Viti Levu. Piippo (1994) noted the taxon as an Asian-Oceanian-Australian species.

62. *Diplasiolejeunea cavifolia* Steph., Species Hepaticarum 5: 918 (1916)

Basionym: *Lejeunea cavifolia* Steph., Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 8: 89. 1886 [1887]

Type citation: Africa. Occid. Insula St. Thomé, Mt Caffe, 700 m, Sept. 1885, *A. Moller 7a.* (Zhu & So 2001).

Illustration: Mizutani (1973: 198, fig. IV; 1973: 200, fig. V, as *H. riddleana*).

Specimens examined: Taveuni Island: *S. & T. Pócs 03288/BK.*

Diplasiolejeunea cavifolia is a new report for the island of Taveuni. Piippo (1994) noted the taxon was a transpacific species.

63. *Harpalejeunea filicuspis* (Steph.) Mizut., Journal of the Hattori Botanical Laboratory 37: 197 (1973)

Basionym: *Drepanolejeunea filicuspis* Steph., Species Hepaticarum 5: 344 (1913)

Type citation: Papua New Guinea, "Nova Guinea, Samarai".

Illustration: Piippo (1985: 139, fig. 5 a-e).

Specimens examined: Kadavu Island: *S. & T. Pócs 03303/AR, 03304/A.* Taveuni Island: *S. & T. Pócs 03289/BK pp.* Viti Levu Island: *T Pócs 08032/N.*

Harpalejeunea filicuspis is a new report for the islands of Kadavu, Taveuni, and Viti Levu. Piippo (1994) noted the taxon was an Asian-Oceanian-Australian species.

64. *Lejeunea discreta* Lindenb., Synopsis Hepaticarum 3: 361 (1845)

Type citation: Indonesia. Java, "inter *L. thymifoliam* β discretam (hb. N[ees])".

Illustration: Mizutani (1970: 237, fig. VII).

Specimens examined: Taveuni Island: *S. & T. Pócs 03289/CA.*

Lejeunea discreta is a new report for the island of Taveuni; *L. discreta* is a widely distributed Indomalesian species (Pócs et al. 2007).

65. *Lejeunea flava* (Sw.) Nees, Naturgeschichte der Europäischen Lebermoose 3: 277 (1838)

Basionym: *Jungermannia flava* Sw., Nova Genera et Species Plantarum: 144 (1788)

Type citation: Jamaica. Swartz s.n. (Lectotype designated by Grolle 1976: UPS-Thunb.-25916, Isolectotype: BM, S).

Illustration: Schuster (1980: 959, fig. 689).

Specimens examined: Taveuni Island: *S. & T. Pócs 03279/BZ.*

Lejeunea flava is a new report for the island of Taveuni. *Lejeunea flava* is a widespread pantropical species (Eggers 2004).

66. *Lejeunea micholitzii* Mizut., Journal of the Hattori Botanical Laboratory 33: 236 (1970)

nom. nov. pro *Hygrolejeunea parvisaccata* Steph., Species Hepaticarum 5: 567. 1914

Type citation: Luzon Benguet, 1884 *Micholitz s.n.* (Holotype: G-24700).

Illustration: Mizutani (1970: 237, fig. VI).

Specimens examined: Kadavu Island: *S. & T. Pócs 03309/L.* Taveuni Island: *S. & T. Pócs 03279/BF, 03282/G, 03288/DC, 03289/BV, BW.*

Lejeunea micholitzii is a new report for the islands of Kadavu and Taveuni. Recorded elsewhere from Sri Lanka, Vietnam, Borneo, Java, Philippines, New Caledonia, New Guinea Vanuatu and Easter Is. (cf. ELPT database).

67. *Lejeunea sordida* (Nees) Nees, Naturgeschichte der Europäischen Lebermoose 3: 278 (1838)

Basionym: *Jungermannia sordida* Nees, Enumeratio Plantarum Cryptogamicarum Javae: 41 (1830)

Type citation: Indonesia. Java, "Inter muscos et Jungermanniae terrestres sparsim; in tumulis Baduorum sanctis; inter alias Jungermannias caespitosa, haud spernenda copia".

Illustration: Mizutani (1970: 243, fig. XII).

Specimens examined: Kadavu Island: *S. & T. Pócs 03300/AP, 03304/BA, 03305/F, 03306/J.* Taveuni Island: *S. & T. Pócs 03282/U.*

Lejeunea sordida is a new report for the islands of Kadavu and Taveuni. Recorded elsewhere from Nicobar Is., Thailand, Borneo, Java, Moluccas, the Philippines, Sulawesi, Bismarck Archipelago, New Guinea, Solomon Is., Queensland, New Caledonia, Samoa, Caroline Is., and the Marianas (cf. ELPT database).

68. *Lejeunea umbilicata* (Nees) Nees, Novorum Actorum Academiae Caesareae Leopoldino-Carolinae Naturae Curiosorum 19 suppl. 1: 472 (1843)

Basionym: *Jungermannia umbilicata* Nees, Enumeratio plantarum cryptogamicarum Javae: 42. (1830)

Type citation: Java, "Inter muscos Javae frequens, saepe fructifera invenitur".

Illustration: Mizutani (1970: 23, fig. V).

Specimens examined: Taveuni Island: *S. & T. Pócs 03278/O, V, 03279/H, AG, 03286/L.*

Lejeunea umbilicata is a new report for the island Taveuni. This species has a Southeast Asian and Pacific distribution, including Borneo, Java, Philippines, Sumatra, New Guinea, New Caledonia, Samoa, Caroline Is., and the Marianas (cf. ELPT database).

69. *Lepicolea rara* (Steph.) Grolle, Nova Hedwigia 16: 152 (1968)

Basionym: *Lepidozia rara* Steph., Species Hepaticarum 3: 618 (1909)

Type citation: Indonesia. "Java (leg.?)".

Illustration: Piippo (1984: 23, fig. 2).

Specimens examined: Taveuni Island: *S. & T. Pócs 03279/S.*

Lepicolea rara is a new report for the island of Taveuni. It has been recorded elsewhere from Thailand, Malay Peninsula, Sumatra, Borneo, Philippines, Sulawesi, Moluccas, Java, New Guinea, Solomon Islands, Society Is, and Chile (cf. ELPT database).

70. *Lepidolejeunea bidentula* (Steph.) R.M.Schust., Phytologia 45: 425 (1980)

Basionym: *Lejeunea bidentula* Steph., Handel-Mazetti, Symbolae Sinicae 5: 51 (1930)

Type citation: Papua New Guinea "Fly River branch, *leg. W. Bäuerlen*, 1885".

Illustration: Piippo (1986: 22-23, figs 4-5).

Specimens examined: Kadavu Island: *S. & T. Pócs 03301/G, 03307/C.* Taveuni Island: *S. & T. Pócs 03288/Z.*

Lepidolejeunea bidentula is a new report for the islands of Kadavu, Taveuni, and Viti Levu. This species has a paleotropical distribution (Piippo 1994).

71. *Lepidolejeunea graeffei* (J.B.Jack et Steph.) R.M.Schust., Phytologia 45: 425 (1980)

Basionym: *Archilejeunea graeffei* J.B.Jack et Steph., Botanisches Centralblatt 60: 104 (1894)

Type citation: Fiji. Viti-Ovalau, in summo monte Tana-lailai, 1864 *Graeffe* (Lectotype designated by Piippo 1986: G-22718 c. per., provisionally selected by Grolle 1983 in sched., isolectotypes: BM, G-14014, G-14015) fide Piippo 1986b.

Illustration: Piippo (1986: 31, fig. 8).

Specimens examined: Taveuni Island: *S. & T. Pócs 03288/BT.*

Lepidolejeunea graeffei is a new report for the island of Taveuni. Piippo (1994) reports this taxon as an Asian-Oceanian species; with records from Philippines, New Guinea, Bismarck Archipelago, Solomon Islands, Vanuatu, Fiji, Samoa, and Caroline Is (cf. ELPT database).

72. *Lepidolejeunea integristipula* (J.B.Jack et Steph.) R.M.Schust., Phytologia 45: 425 (1980)

Basionym: *Pycnolejeunea integristipula* J.B.Jack et Steph., Botanisches Centralblatt 60: 107 (1894)

Type citation: Fiji, "Viti-Ovalau, in monte Tana-lailai. Pauca specimina Taxi-Lejeuneam umbilicatum perrepentia".

Illustration: Piippo (1986: 35, fig. 9).

Specimens examined: Kadavu Island: *S. & T. Pócs 03300/S, 03303/K, 03305/B, 03307/AC.* Taveuni Island: *S. & T. Pócs 03283/Q, 03289/BU.*

Lepidolejeunea integristipula is a new report for the islands of Kadavu and Taveuni. Piippo (1994) reports this taxon as an Asian-Oceanian species; with records from Borneo, Philippines, Java, New Guinea, Solomon Islands, Queensland, Fiji, Samoa, and Caroline Is (cf. ELPT database).

73. *Lopholejeunea eulopha* (Taylor) Schiffn., Nat. Pflanzenfam. [Engler & Prantl]: 129 (1893)

Basionym: *Lejeunea eulopha* Taylor, London Journal of Botany 5: 391 (1846)

Type citation: Pacific Is., Nightingale s.n. Holotype: FH; Isotype: NY. (Gradstein et al. 2002).

Illustration: Thiers & Gradstein (1989: 26, fig. 8).

Specimens examined: Kadavu Island: *S. & T. Pócs 03304/BB.* Taveuni Island: *S. & T. Pócs 0303279/P.* Det. A. Sass-Gyarmati.

Lopholejeunea eulopha is a new report for the island of Kadavu. The species is Palaeotropic, widely distributed in Asia and Africa, and rather frequent in Queensland (Australia) (Sass-Gyarmati 2002).

74. *Lopholejeunea nigricans* (Lindenb.) Schiffn., Conspectus Hepaticarum Archipelagi Indici: 293 (1898)

Basionym: *Lejeunea nigricans* Lindenb., Synopsis Hepaticarum 3: 316 (1845)

Type citation: Indonesia. Java, unknown coll. Holotype: W-Lindenb. (Gradstein et al. 2002); Isotype: G (Gradstein et al. 2002; Zhu & Gradstein 2005).

Illustration: Gradstein et al. (2002: 34, fig.19).

Specimens examined: Kadavu Island: *S. & T. Pócs 03330/AS.* Taveuni Island: *S. & T. Pócs 0303278/J, 03285/M, 03288/AE, 03293/Y, 03299/M, T. Pócs 08012/AB.* Det. A. Sass-Gyarmati.

Lopholejeunea nigricans is a new report for the islands of Kadavu and Taveuni. This species has a pantropical distribution (Piippo 1994).

75. *Lopholejeunea subfusca* (Nees) Schiffn., Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 23: 593 (1897)

Basionym: *Jungermannia subfusca* Nees, Enumeratio Plantarum Cryptogamicarum Javae: 36 (1830)

Type citation: Indonesia. Java, Blume s.n. Holotype: W; Isotype S-B29157 (Gradstein et al. 2002; Zhu & Gradstein 2005).

Illustration: Thiers & Gradstein (1989: 40, fig. 15).

Specimens examined: Kadavu Island: *S. & T. Pócs 03301/F, 03310/C.* Taveuni Island: *S. & T. Pócs 03279/P, 03282/AG, 03285/B, 03279/P, 03282/AG, 03285/B.* Det. A. Sass-Gyarmati.

Lopholejeunea subfusca is a new report for the islands of Kadavu and Taveuni. This is a widespread pantropical species (Sass-Gyarmati 2002).

76. *Mastigolejeunea calcarata* (Steph.) Verd., Blumea 1: 218, 230 (1934)

Basionym: *Archilejeunea calcarata* Steph., Species Hepaticarum 4: 724 (1911)

Type citation: Fiji. "Viti, Ovalau (Seemann)": NY sub *Phragmicoma calcarata* Mitt.

Illustration: Thiers & Gradstein (1989: 45, fig. 16).

Specimens examined: Kadavu Island: *S. & T. Pócs 03304/M, 03305/K, 03309/F.* Det. A. Sass-Gyarmati.

Mastigolejeunea calcarata is a new report for the island of Kadavu. Thiers & Gradstein (1989) also reported this taxon from Australia.

77. *Metalejeunea crassitexta* (J.B.Jack et Steph.) Pócs, comb. nov.

Basionym: *Microlejeunea crassitexta* J.B.Jack et Steph., Botanisches Centralblatt 60: 106 (1894)

Type citation: Fiji. "Viti-Ovalau in monte Tana-Lailai", 1864, *leg. Graeffe.*

This species, purportedly an endemic to the Fiji Islands, was previously known

only from the sterile type material. It shares many characters with *Metalejeunea cucullata* (Reinw. et al.) Grolle. We have found on the specimen from Kadavu Island well-developed perichaetia with *Pycnolejeunea*-type subgynoecial innovations. The pycnolejeuneoid innovation is a critical character of *Metalejeunea* that distinguishes it from *Microlejeunea* which has lejeuneoid innovations. Thus, we hereby transfer *Microlejeunea crassitexta* J.B.Jack et Steph into *Metalejeunea*. In addition, this taxon has no basal ocelli, which is a character of *Metalejeunea*, in contrast to *Microlejeunea*, where basal ocelli regularly occur. *Metalejeunea winkleri* Zhu & Grolle (2002), another species with small lobe cells might be conspecific, if the Fijian taxon has flat perianths.

Illustration: Miller, Bonner & Bischler (1963: 4, tab. 131, fig. a-e, as *Microlejeunea crassitexta*).

Specimens examined: Taveuni Island: *S. & T. Pócs 03288/DR*. Kadavu Island: *S. & T. Pócs 03303/AS*.

Metalejeunea crassitexta is a new report for the islands of Taveuni and Kadavu. It is previously known from Ovalau and Viti Levu (Jack & Stephani 1894).

78. *Metalejeunea cucullata* (Reinw., Blume et Nees) Grolle, Bryophytorum Bibliotheca 48: 100 (1995)

Basionym: *Jungermannia cucullata* Reinw., Blume et Nees, Nova Acta Physico-Medica Academiae Caesareae Leopoldino-Carolinae Naturae Curiosorum Exhibentia Ephemerides sive Observationes Historias et Experimenta 12: 227 (1825)

Type citation: Indonesia. Java, "in lava insula ad terram. *Blume*. V. c. fr.".

Illustration: Zhu & So (2001: 167, fig. 65).

Specimens examined: Kadavu Island: *S. & T. Pócs 03307/N*.

Metalejeunea cucullata is a new report for the island of Kadavu. *Metalejeunea cucullata* is a pantropical species (Zhu & Grolle 2002).

79. *Metzgeria furcata* (L.) Nees, Naturgeschichte der Europäischen Lebermoose 3: 485. 1838)

Basionym: *Jungermannia furcata* L., Species Plantarum: 1136 (1753)

Type citation: Lectotype (Grolle & So 2002): [icon.] "Lichenastrum tenuifolium, furcatum, thecis globosis pilosis" in Dillenius, Historia Muscorum t. 74, f. 45 A-C, F-G (excl. D-E, see Lindberg 1878: 32, 36). 1742 "1741". Epitype (Grolle & So 2002): OXF (hb. Dillenius f.)

Illustration: Schuster (1992: 680, fig. 886).

Specimens examined: Taveuni Island: *S. & T. Pócs 03288/D, AC*.

Metzgeria furcata is a new report for the island of Taveuni. The treatment of Australasian and Pacific *Metzgeria* by So (2002) was followed in this determination. However, it is clear that *M. furcata* represents a group with a complex taxonomy. Recently, Fuselier et al. (2009), in a molecular phylogeny of Northern Hemisphere accessions concluded that *M. furcata*, has a wide disjunct distribution, with populations exhibiting extreme sex ratios, and harbours cryptic lineages.

80. *Phaeolejeunea amicorum* (Hürl.) Pócs, Fieldiana: Botany, n.s. 47: 140 (2008)

Basionym: *Phaeolejeunea etesseana subsp. amicorum* Hürl., Bauhinia 9: 263 (1991)

Type citation: Tonga, "mit anderen Lejeuneaceen auf Rinde eines Baums in mesophilen Primärwald, am Weg von Fuai zum Eastrern Ridge (‚Eua)", ca 130 m ü M. 9. XI. 1951, *leg. H.H. T837* (Holotype: Z, isotypes: G. hb. Hürlimann).

Illustration: Pócs (2008a: 141–142, figs 1–2).

Specimens examined: Viti Levu Island: *T. Pócs 03275/G, 08032/B.*

Phaeolejeunea amicorum is a new report for the island of Viti Levu. This species had previously been recorded in Fiji (Taveuni and Kadavu) by Pócs (2008a). Prior to that it was only known from Tonga (Hürlimann 1991).

81. *Plagiochilion oppositum* (Reinw., Blume et Nees) S.Hatt., Biosphaera 1: 7 (1947)

Basionym: *Jungermannia opposita* Reinw., Blume et Nees, Nova Acta Physico-Medica Academiae Caesareae Leopoldino-Carolinae Naturae Curiosorum Exhibentia Ephemerides sive Observationes Historias et Experimenta 12: 236 (1825)

Type citation: Indonesia. Java, "Inter Hypna et Iungermannias, v. .c. I. scorpioidem, Iavae insulae invenit Blume. V. s. fr.".

Illustration: Inoue (1964: 62, fig. VI).

Specimens examined: Viti Levu Island: *T. Pócs 08023/A.*

Plagiochilion oppositum is a new report for the island of Viti Levu. It is recorded elsewhere from Guangxi, Hainan, Japan, Taiwan, India, Sri Lanka, Burma (Myanmar), Thailand, Vietnam, Borneo, Java, Lesser Sunda Is., Philippines, Sulawesi, Sumatra, New Guinea, Solomons, Queensland, New Caledonia, Samoa, and *Vanuatu* (cf. ELPT database).

82. *Ptychanthus striatus* (Lehm. et Lindenb.) Nees, Naturgeschichte der Europäischen Lebermoose 3: 212 (1838)

Basionym: *Jungermannia striata* Lehm. et Lindenb., Novarum et Minus Cognitarum Stirpium Pugillus 4: 16 (1832)

Type citation: Nepal. "in Nepalia".

Illustration: Thiers & Gradstein (1989: 56, fig. 21); Gradstein et al. (2002: 57, fig. 35).

Specimens examined: Taveuni Island: *S. & T. Pócs 03288/O.* Det. A. Sass-Gyarmati.

Ptychanthus striatus is a new report for the island of Taveuni. This species has a paleotropical distribution (Piippo 1994).

83. *Radula acuminata* Steph., Species Hepaticarum 4: 230 (1910)

Type citation: Vietnam. "Tonkin", 18 Oct 1887, *B. Balansa s.n.*, herb. Paris 1890. Holotype: G-35916; Isotype: G-35915, PC (So 2006).

Illustration: Yamada (1979: 287, fig. 47).

Specimens examined: Taveuni Island: *S. & T. Pócs 0379/BA.*

Radula acuminata is a new report for the island of Taveuni. The species has a wide

distribution including China, Japan, Sri Lanka, Cambodia, Thailand, Vietnam, Borneo, Java, New Guinea and New Caledonia (cf. ELPT database).

84. *Radula multiflora* Gottsche ex Schiffn., Forschungsreise S.M.S. 'Gazelle'. 4, Botanik: 20 (1889) [1890]

Type citation: New Guinea. Bismarck Archip., New Hannover Island, 20 Jul 1875, Gazelle Exped., F. C. Natonann s.n. as R. javanica (Lectotype designated by Castle 1966: FH-60323, isolectotypes: W-5145, YU). New Ireland. ins. '... Neu-Mecklenburg..' 19 Aug 1875, F. C. Na.

Illustration: Renner & de Lange (2009: 3, fig. 1, 2).

Specimens examined: Taveuni Island: *S. & T. Pócs 03288/AH, 03293/A, Z, 03294/B, 03295/F, 03298/T.* Kadavu Island: *S. & T. Pócs 03303/X.*

Radula multiflora is a new report for the islands of Taveuni and Kadavu. This species is found throughout SE Asia and the western pacific, from Sumatra to New Caledonia, Samoa and Tahiti (Yamada 1979).

85. *Radula protensa* Lindenb., Botanische Zeitung. Berlin 6: 462 (1848)

Type citation: Indonesia. Java. *Zollinger 577.* Holotype: BM; Isotype: G, P (Zhu & So 2001).

Illustration: Yamada (1979: 293, fig. 51).

Specimens examined: Taveuni Island: *S. & T. Pócs 03286/AB.*

Radula protensa is a new report for the island of Taveuni. It has been recorded elsewhere from India, Sumatra, Borneo, Philippines, Java, New Guinea, and Society Is (cf. ELPT database).

86. *Spruceanthus polymorphus* (Sande Lac.) Verd., Annales Bryologici, suppl. 4: 155 (1934)

Basionym: *Phragmicoma polymorpha* Sande Lac., Nederlandsch Kruidkundig Archief. Verslangen en Mededelingen der Nederlandsche Botanische Vereeniging 3: 420 (1854) [1855]

Type citation: Indonesia. Java, *leg. Junghuhn.* Source: IH online.

Illustration: Gradstein et al. (2002: 69, fig. 43).

Specimens examined: Kadavu Island: *S. & T. Pócs 03300/AO.* Det. A. Sass-Gyarmati.

Spruceanthus polymorphus is a new report for the island of Kadavu. This species has a broad distribution throughout southeast Asia and the Pacific, including China, Japan, India, Indonesia, New Guinea, Philippines, Australia, and islands throughout the South Pacific (Zhu & So 1999). Gradstein et al. (2002) discussed the relationship between *Spruceanthus* and *Archilejeunea*, where some authors have placed it, yet they retained the species under *Spruceanthus* until the oil bodies could be studied on living material. This will be imperative in future collections in Fiji.

87. *Thysananthus spathulistipus* (Reinw., Blume et Nees) Lindenb., Synopsis Hepaticarum 2: 287 (1845)

Basionym: *Jungermannia spathulistipa* Reinw., Blume et Nees, Nova Acta Physico-Medica Academiae Caesareae Leopoldino-Carolinae Naturae Curiosorum Exhibentia Ephemerides sive Observationes Historias et Experimenta 12: 212 (1825)

Type citation: Indonesia. Java, "in montibus (v. c. Monte Leback) Provinciae Bantam Iavae insula. Blume. V. c. cal.".

Illustration: Thiers & Gradstein (1989: 74, fig. 28); Gradstein et al. (2002: 81, fig. 51).

Specimens examined: Kadavu Island: *S. & T. Pócs 03304/M.* Det. A. Sass-Gyarmati.

Thysananthus spathulistipus is a new report for the island of Kadavu. This is a pantropical species widely distributed in Africa, Southeast Asia and Oceania (Sass-Gyarmati 2003).

Acknowledgments

The financial assistance of the National Geographic Committee for Research and Exploration (Grant No. 8247-07), GBIF Seed Money Award No. 2007/41, and the Field Museum Woman's Board, Field of Dreams Program are warmly acknowledged. The first author was financed in 2003 by the AMFK (Hungarian Ministry of Education) and by ALCOA Foundations (USA). He is also thankful for his wife, Sarolta Pócs's field assistance. The authors also are especially grateful to Anders Hagborg and Lars Söderström of the Early Land Plants Today (ELPT) project for their comments and corrections as well as access to their databases. We also express our gratitude to Matt Renner for some useful comments as well John J. Engel and Endymion Cooper for useful discussion on *Telaranea*. We warmly thank the valuable assistance, guidance, and logistical support provided by the Suva Herbarium, support in the field by Jone Navuso.

References

Allorge V & Jovet-Ast S (1950) *Aphanolejeunea teotonii* nov. sp., hépatique des Açores *Revue Bryologique et Lichénologique* 19: 19–24.

Asthana G. & Srivastava SC (2003) Indian *Cololejeunea*. A taxonomic study. *Bryophytorum Bibliotheca* 60: 1–155.

Benedix EH (1953) Indomalayische Cololejeuneen Feddes Repertorium Specierum Novarum Regni Vegetabilis. *Beiheft* 134: 1–88.

Bonner CEB (1953) De Hepaticis III. A contribution to the study of the genus *Ceratolejeunea* (Spruce) Schiffner. *Candollea* 14: 163–252

Braggins JE (1999) *Cololejeunea cardiocarpa* (Lejeuneacee), a new hepatic record in New Zealand. *New Zealand Journal of Botany* 37: 79–82.

Daniels AED, Kariyappa KC & Daniel P (2010) Circumscription of the polymorphic *Cololejeunea lanciloba* Steph.(Lejeuneaceae, Hepaticae) and species falling within it. *Acta Botanica Hungarica* 52: 287–295.

DoE (Department of the Environment) (1997) *Convention on Biological Diversity 1997. National Report to the Conference of the Parties by the Republic of Fiji.* (Department of the Environment, Ministry of Local Government, Housing and Environment: Suva, Fiji).

Eggers J (2004) New bryopyte taxon records for tropical countries 5. *Tropical Bryology* 25: 19-23.

Eggers J, Frahm JP & Pursell RA (1998) New bryophyte taxon records for tropical countries II. *Tropical Bryology* 14: 81–84.

Eifrig H (1937) "1936": Monographische studien über die. Indomalayischen Arten von *Taxilejeunea*. *Annales Bryologici* 9: 73–114.

Engel JJ (2006) Austral Hepaticae 42. The Austral species of *Mnioloma* (Calypogeiaceae), together with a new species, *Mnioloma novaezelandiae* n. sp. *Cryptogamie Bryologie* 27: 111–117.

Engel JJ & Smith Merrill GL (2004) Austral Hepaticae 35. A taxonomic and phylogenetic study of *Telaranea* (Lepidoziaceae), with a monograph of the genus in temperate Australasia and commentary on extra-Australasian taxa. *Fieldiana, Botany, n.s.* 44: 1–265.

Engel JJ & Glenny D (2008) *A Flora of the Liverworts and Hornworts of New Zealand. vol. 1*. St. Louis, Missouri Botanical Garden Press, 897 pp.

Evans AW (1905) New or noteworthy Hepaticae from Florida. *Bulletin of the Torrey Botanical Club* 32: 179–192.

Fuselier L, Davison PG, Clements M, Shaw B et al. (2009) *Phylogeographic analyses reveal distinct lineages of the liverworts Metzgeria furcata (L.) Dumort. and Metzgeria conjugata Lindb. (Metzgeriaceae) in Europe and North America*, Biological Journal of the Linnean Society 98: 745-756.

Gradstein SR, He-Nygrén XL, Piippo S & Mizutani M (2002) Bryophyte flora of the Huon Peninsula, Papua New Guinea. LXVIII. Lejeuneaceae subfamily Ptychanthoideae (Hepaticae). *Acta Bot. Fennica* 174: 1–88.

Grolle R (1976) Verzeichnis der Lebermoose Europas und benachbarter Gebiete. *Feddes Repertorium* 87: 171–279.

Grolle R (1979) Miscellania Hepaticologica 181-190. *Journal of the Hattori Botanical Laboratory* 45: 173–183.

Grolle R (1980) Zur kenntnis der Lebermoose von Samoa I. *Wissenschaftliche Zeitschrift der Friedrich-Schiller-Universität Jena/Thüringen. Matematisch-naturwissenschaftliche Reihe* 29: 637–648.

Grolle R & So ML (2002) Typifications of three old names of Metzgeria species (Hepaticae): *Jungermannia furcata* L. 1753 m *J. linearis* Sw. 1788 and *J. pubescens* Schrank 1792. *Cryptogamie, Bryologie* 23: 119–121.

Herzog T (1932) Neue Hepaticae aus der weiteren Indomalaya. *Annales Bryologici* 5: 83-98.

Herzog T (1936) Studien über *Drepanolejeunea* III. *Annales Bryologici* 9: 115–130.

Hürlimann H (1987) Hepaticae aus dem Gebiete des südlichen Pazifik IX. *Bauhinia* 8: 221–234.

Hürlimann H (1991) Hepaticae aus dem Gebiete des südlichen Pazifik. XI. *Bauhinia* 9: 257–264.

Inoue H (1964) The genus *Plagiochilion*. *Journal of the Hattori Botanical Laboratory* 27: 51–72.

Isono S (2009) Lejeuneaceae in Kanagawa, Japan 2. *Natural Environmental Science Research* 22: 39–50.

Jack JB & Stephani F (1894) Hepaticae in insulis Vitibuensibus et Samoanis a Dre Ed. Graeffe anno 1864 lectae. *Botanisches Centralblatt* 60: 97–109.

Jones EW (1972) African hepatics XXIII. Some species of *Lejeunea*. *Journal of Bryology* 7: 23–45.

Jovet-Ast S (1953) Le genre *Colura*: Hépatiques, Lejeuneaceae, Diplasieae. *Revue Bryologique et Lichénologique, Nouvelle Série* 22: 206–312.

Kachroo P & Schuster RM (1961) The genus Pycnolejeunea and its affinities to *Cheilolejeunea, Enosmolejeunea, Nipponolejeunea, Tuyamaella, siphonolejeunea* and *Strepsilejeunea*. *Journal of the Linnean Society. Botany* 56: 475–511.

Miller HA (1956) Cryptogams of Kapingamarangi Atoll, Carolina Islands. I. Bryophyta. *The Bryologist* 59: 167–173.

Miller HA (1968) Bryophyta of Guam and northern Micronesia. *Micronesica* 4: 49–83.

Miller HA (1986) Pacific Bryophytes 3. An overview of Telaranea, Hepatophyta. *Journal of Bryology* 14: 231–244.

Miller HA, Whittier HO & Bonner CEB (1963a) Bryoflora of the atolls of Micronesia. *Beihefte zur Nova Hedwigia* 11: 1–92.

Miller, H.A., Bonner, CEB. and Bischler H (1963b) Studies in Lejeuneaceae V. *Microlejeunea* in Pacific Oceania. *Nova Hedwigia* 4: 551–560.

Miller HA, Whittier HO & Whittier BA (1983) Prodromus florae hepaticarum Polynesiae. Catalogue of Hepaticae and Anthocerotae. *Bryophytorum Bibliotheca* 25: 1–423.

Mizutani M (1961) A revision of Japanese Lejeuneaceae. *Journal of the Hattori Botanical Laboratory* 24: 115–302.

Mizutani M (1963) On some Indian species of the family Lejeuneaceae described by W. Mitten. *Journal of the Hattori Botanical Laboratory* 26: 171–184.

Mizutani M (1965) Studies of little known Asiatic species of Hepaticae in the Stephani Herbarium. 2. On some little known southeast Asiatic species of the genus *Cololejeunea*. *Journal of the Hattori Botanical Laboratory* 28: 107–121.

Mizutani M (1967) Studies of little known asiatic species of Hepaticae in the Stephani Herbarium. 3. On some little known species of *Cheilolejeunea*, *Euosmolejeunea* and *Pycnolejeunea*. *Journal of the Hattori Botanical Laboratory* 30: 171–180.

Mizutani M (1968) Studies of little known Asiatic species of Hepaticae in the Stephani Herbarium. 4. *Phaeolejeunea*, a new genus of Lejeuneaceae. *Journal of the Hattori Botanical Laboratory* 31: 130–134.

Mizutani M (1970) Lejeuneaceae, subfamilies Lejeuneoideae and Cololejeuneoideae, from Sabah (North Borneo). *Journal of the Hattori Botanical Laboratory* 33: 225–265.

Mizutani M (1973) The genus *Harpalejeunea* from Sabah (North Borneo). *Journal of the Hattori Botanical Laboratory* 37: 191–203.

Mizutani M (1980) Notes on the Lejeuneaceae. 3. Some Asiatic species of the genus *Cheilolejeunea*. *Journal of the Hattori Botanical Laboratory* 47: 319–331.

Mizutani M (1982) Notes on the Lejeuneaceae. 6. Japanese species of the genus *Cheilolejeunea*. *Journal of the Hattori Botanical Laboratory* 51: 151–173.

Muzutani M (1990) Notes on the Lejeuneaceae. 16. *Drepanolejeunea thwaitesiana* and its related species from Asia. *Journal of the Hattori Botanical Laboratory* 68: 367–380.

Piippo S (1984) Bryophyte flora of the Huon Peninsula, Papua New Guinea. III. Haplomitriaceae, Lepicoleaceae, Herbertaceae, Pseudolepicoleaceae, Trichocoleaceae, Schistochilaceae, Balantiopsaceae, Pleuroziaceae and Porellaceae (Hepaticae). *Annales Botanci Fennici* 21: 21–48.

Piippo S (1985) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XII. Geocalycaceae (Hepaticae). *Acta Botanica Fennica* 131: 129–167.

Piippo S (1986) A monograph of the *Lepidolejeunea* and *Luteolejeunea* (Lejeuneaceae: Hepaticae). *Acta Botanica Fennica* 132: 1–69.

Piippo S (1994) On the bryogeography of Western Melanesian Lejeuneaceae, with comments on their epiphyllous occurrence. *Tropical Bryology* 9: 43–58.

Pócs T (2008a) Bryophytes from the Fiji Islands, III. The genus *Phaeolejeunea* Mizut. (Lejeuneaceae), with detailed description of *P. amicorum* (Hürl.) Pócs, stat. nov. *Fieldiana: Botany, n.s.* 47: 139–145.

Pócs T (2008b) Bryophytes from the Fiji Islands, IV. The genus *Frullania* Raddi (Jungermanniopsida), I., with description of *F. vivipara* Pócs, spec. nov. *Fieldiana, Botany* 47: 147–158.

Pócs T (2010) On some less known *Lejeunea* (Lejeuneaceae, Jungermanniopsida) species in tropical Africa. East African Bryophytes XXVII (with 9 plates). *Nova Hedwigia, Beiheft* 138: 99–116.

Pócs T. & Eggers J (2007) Bryophytes from the Fiji Islands, II. An account of the genus *Colura*, with the description of *C. vitiensis* sp. nov. *Polish Botanical Journal* 52(2): 81–92.

Pócs T & Streimann H (2006) Contributions to the bryoflora of Australia I *Tropical Bryology* 27: 19–24.

Pócs T & Bernecker A (2009) Overview of *Aphanolejeunea* (Jungermanniopsida) after 25 years. *Polish Botanical Journal* 54: 1–11.

Pócs T & Piippo S (2011) Bryophyte flora of the Huon Peninsula, Papua New Guinea. LXXI. *Cololejeunea* (Lejeuneaceae, Jungermanniopsida). *Acta Bryolichenologica Asiatica* 4: (in press).

Pócs, T, Nair MC, Rajesh KP & Madhusoodanan PV (2007) Liverwort (Marchantiopsida) records from the Western Ghats (Kerala State, Peninsular India). *Acta Botanica Hungarica* 49: 121–129.

Renner MAM & Braggins JE (2006) Hepatic records for Australia and New Zealand. *Australasian Bryological Newsletter* 52: 9–13.

Renner MAM & Brown EA (2008) *Mnioloma* (Calypogeiaceae: Jungermanniopsida) in Australasia: how many species are there? *Fieldiana, Botany* 47: 159–174.

Renner MAM & de Lange PJ (2009) *Radula multiflora* Gottsche ex Schiffn. – a new record for the Chatham Islands, New Zealand. *Australasian Bryological Newsletter* 57: 12–13.

Sass-Gyarmati A (2002) Ptychanthoideae (subfam. of Lejeuneaceae, Hepaticae) from Vanuatu, with the description of *Candalejeunea streimannii* Gyarmati sp. n. *Tropical Bryology* 22: 125–134.

Sass-Gyarmati A (2003) Records on the distribution of Ptychanthoideae (subfam. of Lejeuneaceae, Hepaticae) in Australia. *Tropical Bryology* 24: 21–31.

Schuster RM (1980) *The Hepaticae and Anthocerotae of North America* IV. (New York: Columbia University Press) 133 pp. not sure if the pp are enclosed in the parentheses

Schuster RM (1992) *The Hepaticae and Anthocerotae of North America* VI. (New York: Columbia University Press) 937 pp.

Schuster RM (2000) Austral Hepaticae, Part. 1. *Nova Hedwigia, Beiheft* 118: 1–524.

So ML (2000) Studies on *Plagiochila* (Hepaticae) in Australasia and the Pacific II. *Cryptogamie, Bryologie* 21: 223–231.

So ML (2002) *Metzgeria* (Hepaticae) in Australasia and the Pacific. *New Zealand Journal of Botany* 40: 603–627.

So ML (2006) *Radula* (Radulaceae, Marchantiophyta) in the South Pacific. *Journal of the Hattorial Botanical Laboratory*. 99: 207–232.

Söderström L, Gradstein SR & Hagborg A (2010) Checklist of hornworts and liverworts for Java. *Phytotaxa* 9: 53–149.

Staples GW & Imada CT (2007) Checklist of Hawaiian Anthocerotes and Hepatics. *Tropical Bryology* 28: 15–47.

Stephani F (1985) Icones Hepaticarum, Jardin Botanique Genève, 12315 pp. IDC, Zug (165 microfiches).

Thiers BM (1988) The Australian species of *Cololejeunea*. *Beihefte zur Nova Hedwigia* 90: 113–146

Thiers BM (1993) A monograph of *Pleurozia* (Hepaticae; Pleuroziaceae). *The Bryologist* 96: 517–554.

Thiers BM & Gradstein SR (1989) Lejeuneaceae (Hepaticae) of Australia. I. Subfamily Ptychanthoideae. *Memoirs of the New York Botanical Garden* 52: 1-79.

Tixier P (1979) Contribution à l'étude du genre *Cololejeunea*. Les Cololejeunoidées de Nouvelle Caledonie. *Nova Hedwigia* 31: 721–787.

Tixier P (1985) Contribution à la Connaissance des Cololejeunoideae. *Bryophytorum Bibliotheca* 27: 1–440.

Tixier P (1993) Information on the Genus *Cololejeunea* (Lejeuneaceae, Hepaticae) XI. Some Pedinolejeunea in Austral Regions. *Cryptogamie: Bryologie, Lichénologie* 14: 353–360.

von Konrat M, Naikatini A, Tuiwawa M, Söderström L, Fife A, Renner M, Brownsey P, Perrie L, Hagborg A, Pócs T, Lumbsch HT, Braggins J, Séneca A & Brown E (2011) A brief history of the cryptogams of Fiji and prospects for the future. *Telopea* 13: 361–374.

Yamada K (1979) A revision of Asian taxa of *Radula*, Hepaticae. *Journal of the Hattori Botanical Laboratory* 45: 201–322.

Zhu RL (1995) Notes on some species of the genus *Cololejeunea* (Lejeuneaceae, Hepaticae) in China. *Journal of the Hattori Botanical Laboratory* 78: 83–109.

Zhu RL (2005) *Cololejeunea aequabilis* (Sande Lac.) Schiffn. (Jungermanniopsida: Lejeuneaceae), the correct name for Cololejeunea yulensis (Steph.) Benedix. *Journal of Bryology* 27: 357–358.

Zhu RL & Gradstein SR (2005) Monograph of *Lopholejeunea* (Spruce) Schiffn. (Lejeuneaceae, Hepaticae) in Asia. *Monographs in Systematic Botany from the Missouri Botanical Garden* 74: 1–98.

Zhu RL & Grolle R (2002) *Metalejeunea winkleri* R.-L. Zhu & Grolle (Lejeuneaceae, Hepaticae), a new species from Borneo. *Nova Hedwigia* 74: 497–500.

Zhu RL & Grolle R (2003) Taxonomy and distribution of *Lejeunea exilis* (Lejeuneaceae, Hepaticae). *Annales Botanici Fennici* 40: 101–106.

Zhu R-L & Grolle R (2004) Nomenclatural notes on *Cheilolejeunea inaequitexta* and *C. trapezia* (Lejeuneaceae, Hepaticae). *Annales Botanci Fennici* 41: 445–447.

Zhu RL & So ML (1999a) Additions to the Lejeuneaceae taxa to the hepatic flora of Yunnan, China. *Annales Botanici Fennici* 36: 219–229.

Zhu RL & So ML (1999b) New records of *Cololejeunea* for China and Vietnam *Botanical Bulletin of Academia Sinica, n.s.* 40: 165–171.

Zhu RL & So ML (2001) Epiphyllous liverworts of China. *Beiliefte zur Nova Hedwigia* 121: 1–418.

Zhu RL & So ML (2002) Reappraisal of *Cololejeunea angustiflora, C. ciliata, C. flavicans, C. javanica* and *C. mackeeana* (Hepaticae, Lejeuneaceae). *The Bryologist* 105: 431–438.

Zhu RL, Long DG & Yamaguchi T (1999) *Cololejeunea yulensis* (Steph.) Benedix and Raphidolejeunea spicata (Steph.) Grolle new to Japan, with taxonomic notes on *Cololejeunea obliqua* (Nees & Mont.) Schiffn. *Journal of Bryology* 21: 293–297.

Zhu RL, So ML & Wang Y-F (2002) The genus *Cheilolejeunea* (Hepaticae, Lejeuneaceae) in China. *Nova Hedwigia* 75: 387–408.

Manuscript received 20 January 2011, accepted 22 August 2011

Appendix 1: List of localities

The abbreviated collection data provided in the specimen examined sections can be cross referenced below with the full detailed collection data.

03252: W part of VITI LEVU Island, at the N edge of NAUSORI Highlands, ENE of NAUSORI village, at 600–620 m alt. S 17°49.033', E 177°37.338–38.046'. Secondary submontane rainforest with moderate number of epiphytes incl. epiphylls. 18. Aug. 2003.

03253: W part of VITI LEVU Island, at the N edge of NAUSORI Highlands, W of BUKUYA village, at 570 m alt. S 17°48.173', E 127°39.675'. Submontane rainforest, streamside type with higher number of epiphytes. 18. Aug. 2003.

03255: Southern coast of VITI LEVU Island ('Coral Coast') in the high rainfall area. Tambua Sands Beach Resort E of NAMADA village, at 3-5 m alt. S 18°11.472', E 177°37.582'. Coconut stand and garden trees. 19. Aug. 2003.

03256: Southern coast of VITI LEVU Island ('Coral Coast') in the high rainfall area. 1.2 km N of KOROLEVU, at 34 m alt. S 18°11.025', E 177°41.914'. Lowland rainforest along streamside in a side valley, rich in epiphytes, incl. epiphylls. 19. Aug. 2003

03258: Southern coast of VITI LEVU Island ('Coral Coast') in the high rainfall area. In the narrow valley below BIASEVU ('Savu Na Mate Laya') waterfall, 2.5 km N of KOROLEVU. S 18°11–12', E 177°42'. Wet lowland rainforest on volcanic ground. 19. Aug. 2003.

03259: Southern coast of VITI LEVU Island ('Coral Coast') in the high rainfall area. PACIFIC HARBOUR township area, at 2–3 m alt. S 18°15.041', E 178°03.913'. On

garden and on roadside trees. Among lagunes, on the place of former mangrove and coastal forest vegetation. 20. Aug. 2003.

03260: Southern coast of VITI LEVU Island ('Coral Coast') in the high rainfall area. Between NAVULA and LOMBAU villages, along the Queens Road, at 2–3 m alt. S 18°12.483', E 178°10.813'. 10–12 m tall *Pandanus tectorius* dominated swamp forest adjoining mangroves along lagunes on the coastal plain. 20. Aug. 2003.

03261: Southern coast of VITI LEVU Island ('Coral Coast') in the high rainfall area. Near NABUKAVESI village, 10 km N of LOMBAU, at 30-60 m alt. S 18°07–09', E 178°13.23–13.08'. Primary, wet lowland rainforest, on rugged volcanic hills, partly along streamlet. 20. Aug. 2003.

03262: North-eastern coast of VITI LEVU Island, at NATALEIRA eco-village. On the foothills of mountains behind the village, at 50-60 m alt. S 17°35.888', E 178 °28.965'. Mesic rainforest on acidic, ferralitic soil. 21. Aug. 2003.

03263: North-eastern coast of VITI LEVU Island, near NAYARUTOKA village, 0-2 m. S 17°33.339', E 178°24.746'. 10–12 m tall mangrove forest. 22. Aug. 2003.

03264: North-eastern coast of VITI LEVU Island, in the dry evergreen forest belt, SSE of NAMARAI village, at 50-60 m alt. S 17°32.844', E 178°22.118'. Riverine (gallery) forest and shady volcanic tuff cliffs. 22. Aug. 2003.

03267: North coast of VITI LEVU Island. 15 km WSW of RAKIRAKI town, at 16-25 m alt. S 17 °23.608', E 178°15.408'. Dry semi-deciduous forest on volcanic breccia rocks. 22. Aug. 2003.

03269: Northern central part of VITI LEVU Island. SW ridge of Mt TAMANIVI (Mt Victoria), at 800 m alt, 3 km S of NAVAI, 28 km on the road from Tavua. S 17°40.410', E 177°59.363'. Mossy montane rainforest (cloud forest). 23. Aug. 2003.

03271: Central VITI LEVU, below the NE escarpment of RAIRAIMATUKU Plateau, 1 km NW of NAQELEWAI village, in the NABOUBUCO River Valley, at 250 m alt. S 17°42.650', E 178°04.950'. Wet lowland rainforest rich in epiphylls. 24. Aug. 2003.

03273: Central VITI LEVU, NE edge of RAIRAIMATUKU Plateau, above NAQELEWAI village, S from 'Barclay's Point', at 855–945 m alt. S 17°44.208–264', E 178°03.300–573'. Montane mossy (cloud) forest. 24. Aug. 2003.

03274: Central VITI LEVU, on the ridge of RAIRAIMATUKU Plateau 10 km SSE of NAVAI. S 17°43.503', E 178°02.252'. Mossy elfin forest (cloud forest) built up mostly by *Cyathea* sp. and by the 3-4 m tall *Alpinia boia*, at 990–1010 m alt. 24. Aug. 2003.

03275: Central VITI LEVU, at the N end of RAIRAIMATUKU Plateau, along the road, 3 km S of NAVAI village, at 820 m alt. S 17°38.857', E 117°59.149'. At a phallus shaped volcanic conglomerate rock, surrounded my mesic rainforest. 24. Aug. 2003.

03276: SE part of VITI LEVU Island. COLO-I-SUVA 10 km NNE of SUVA town, in the garden or Raintree Lodge, at 185 m alt. S 18°03.498', E 178°27.44'. Secondary wet lowland rainforest (by 4240 mm annual rainfall). 25. Aug. 2003.

03278: Central part of TAVEUNI Island. DES VOEUX Peak. S 16°50.638', W 179°57.991'. 1.5–2.5 m tall bush formed by a pachycaul Asteraceae on the summit ridge, at 1180–1194 m alt. 27. Aug. 2003.

03279: Central part of TAVEUNI Island. NE side of DES VOEUX Peak, at 1040–1150 m alt. S 16°50.295–445', W 179°58. 037–224'. 4–8 m tall mossy elfin forest, very rich in epiphytes. 27. Aug. 2003.

03280: Central part of TAVEUNI Island. NE side of DES VOEUX Peak, at 960 m alt. S 16°50.220, W 179°58.369'. 10–20 m tall, mossy montane rainforest. 27. Aug. 2003.

03281: NE part of TAVEUNI Island. On the ridge between QELENI and WELAGI villages, at 500 m alt. S 16°45.285', W 179°54.306'. Submontane rainforest with many tree-ferns along brook. 27. Aug. 2003.

03282: E side of TAVEUNI Island. Around the I[st] TAVORO Waterfalls, above KOROVOU (BOUMA) village, at 10–100 m alt. S 16°49.608–620', W 179°52.555–850'. Very wet lowland rainforest and woody cultivation, with many tree-fens and epiphytes. 29. Aug. 2003.

03283: LAVENA Beach along the SE coast of TAVEUNI Island at 1–3 m alt. S 16°52.261–491', W 179°52.162–755'. Coconut growth intermixed with the remnants of coastal bush and forest, formed by *Barringtonia asiatica*, *Pandanus* and *Hibiscus tiliaceus*. 30. Aug. 2003.

03284: NABOUCANDRA Beach on the SE coast of TAVEUNI Island, W of LAVENA village. Degraded *Barringtonia – Hibiscus* coastal forest intercropped by coconut (*Cocos nucifera*), at 2–4 m alt. S 16°52.303', W 179°53.574'. 30. Aug. 2003.

03285: WAINISARI Beach on the SE coast of TAVEUNI Island, between NABA village and the estuary of WAINIBAU Stream, at 4–10 m alt. S 16°52.322–386', W 179°53.270–864'. Rocky (volcanic) coastal forest with many tree-ferns, here and there intercropped by coconut (Cocos nucifera). 30. Aug. 2003.

03286: WAINIBAU Stream valley on the SE coast of TAVEUNI Island, below the gorge of WAINIBAU Waterfalls, at 1-15 m altitude. S 16°51.950'–52.386', W 179°54.270-331'. Lowland rainforest. 30. Aug. 2003.

03287: NEISOGO (NASELESELE) Point on the NE end of TAVEUNI Island opposite of the small VIUBANI Island, at 0.5–1.5 m altitude, S 16°41.964', W 179°51.895'. Coconut growth intermixed with coastal *Barringtonia – Hibiscus tiliaceus* bushes. 31. Aug. 2003.

03288: Central part of TAVEUNI Island. Along the road from WAIRIKI to DES VOEUX Peak, on the NW slopes at 600–700 m alt. S 16°49.639–758', W 179°58.826–943'. Montane rainforest rich in epiphytes. 1. Sept. 2003.

03289: Central part of TAVEUNI Island. Along the road from WAIRIKI to DES VOEUX Peak, on the NW slopes, at 715–750 m alt. S 16°49.831–915', W 179°58.643–731'. Mossy montane rain forest with transitions to elfin forest. 1. Sept. 2003.

03290: NW coast in the SW part of TAVEUNI Island. Taveuni Estates above SAQULU, on the foothills of Mt ULUIGALAU, at 360 m alt. S 16°51.295', E 179°59.024'. Degraded submontane rainforests. 3. Sept. 2003.

03291: SW end of TAVEUNI Island. Between Vuna Lagoon Lodge and VUNA village, at 0.5–3 m alt. S 16°58.141–212', E 179°53.405–4223'. Coastal bush dominated by *Barringtonia asiatica* and *Hibiscus tiliaceus*, with coconut on volcanic rocks. 4 and 7 Sept. 2003.

03292: S tip of TAVEUNI Island. NE slope of Mt DELAIVUNA, at 120–170 m alt. S 16°59.458', E 179°55.201'. Somewhat disturbed, relatively dry lowland rainforest dominated by 20-30 m tall *Barringtonia edulis*. 4 Sept. 2003.

03293: S tip of TAVEUNI Island. On the NE slopes and in the crater of the extinct TAVUYAGEA volcano, at 150–295 m altitude, S 16°59.660–662', E 179°55.296–360'. Relatively dry *Barringtonia edulis* dominated lowland rainforest on the outer slopes and wet rainforest with many epiphytes (incl. epiphylls) in the crater. 5. Sept. 2003.

03294: S tip of TAVEUNI Island, Behind the 'BLOW HOLE' at 8–10 m alt. S 17°00.260', E 179°55.773'. *Pandanus tectorius* stand with transitions to coastal forest, on lava rocks. 6. Sept. 2003.

03295: SSE coast of TAVEUNI Island, WSW of NAVAKA-WAU, at 8 m alt. S 17°00.151', E 179°55.926'. *Barringtonia asiatica* dominated coastal forest. 6 Sept. 2003.

03296: SW part of TAVEUNI Island, on the foothills at the SW end of the central mountain range, between SALIALEVU and NAQARAWALU villages, at 100–200 m alt. S 16°57.934–58.598', E 179°57.431–678'. Wet, degraded lowland rainforest and coconut plantations. 6 Sept. 2003.

03297: E side of TAVEUNI Island. Around the Ist TAVORO Waterfall, above KOROVOU (BOUMA) village, at 10–100 m alt. S 16°49.564–620', W 179°52.420–800'. Cultivated area and degraded lowland rainforest. 8. Sept. 2003.

03298: E side of TAVEUNI Island. Around the IInd TAVORO Waterfall, above KOROVOU (BOUMA) village, at 120–150 m alt. S 16°49.640-680', W 179°52.960'–53.050'. Wet lowland rainforest, somewhat degraded. 8 Sept. 2003.

03299: E side of TAVEUNI Island. Between the IInd and IIIrd TAVORO Waterfalls, above KOROVOU (BOUMA) village, at 150–160 m alt. S 16°49.564-620', W 179°52.420–800'. Very humid primary lowland rainforest, rich in epiphytes and epiphylls. 8. Sept. 2003.

03300: Central part of KADAVU (Kandavu) Island. 2-3 km NNE of VUNISEA, along the Namara Road, on the slopes at 120–165 m alt. S 19°01.731–880', E 178°10.265–750'. Secondary lowland rainforest on lilac volcanic soil. 10. Sept. 2003.

03301: Central part of KADAVU (Kandavu) Island. 2–3 km NNE of VUNISEA, along the Namara Road, in a valley below waterfall, at 110–150 m alt. S 19°01.826-923', E 178°775–815'. Less disturbed lowland rainforest along rocky streamlet. 10. Sept. 2003.

03302: West part of KADAVU (Kandavu) Island. 2.5 km W of VUNISEA, on the north coast, at 1–20 m altitude. S 19°02.705', E 178°08.221'. Rocky, shady coastal forest dominated by *Barringtonia asiatica, Ficus* sp. *and Hibiscus tiliaceus,* with *Entada* liana on lava rocks and coastal bush with coconut and with *Scaevola* sp. on the coral sand of the beach. 11. Sept. 2003.

03303: Central part of KADAVU (Kandavu) Island. On the coastal ridge, 0.5–1.5 km N of VUNISEA, at 40–80 m altitude, on lilac volcanic soil. S 19°02.390–529', E 178°09.554–608'. Dry evergreen microphyllous forest with emergent *Allocasuarina* trees, many creeping *Flagellaria* and with *Schizaea dichotoma* and Cyperaceae common in the ground layer. 12. Sept. 2003.

03304: Western part of KADAVU (Kandavu) Island. 2 km NE of TAVUKI village, at 170-200 m altitude, on orange-red volcanic soil. S 19°03.829–04.102', E 178°07.771–921'.

Dry evergreen microphyllous forest with emergent *Allocasuarina* trees, many creeping *Flagellaria* and with *Schizaea dichotoma* and Cyperaceae common in the ground layer. 13. & 15. Sept. 2003.

03305: Western part of KADAVU (Kandavu) Island. 3 km NNE of TAVUKI village, on a ridge at 220–240 m altitude, on orange-red volcanic soil. S 19°03.621-678', E 178°07.743–844'. Dry evergreen microphyllous forest with emergent *Allocasuarina* trees, with transitions to mesic evergreen rain forest. 13. Sept. 2003.

03306: Western part of KADAVU (Kandavu) Island. 3.5 km NE of TAVUKI village, on the M slope and summit of KORONIQUALA Hill, at 250–370 m altitude. S 19°03.298–366', E 178°08.0.25–126'. Mesic submontane rainforest with tree-ferns, no epiphylls. 13 Sept. 2003.

03307: Central part of KADAVU (Kandavu) Island. On the ridge SE of VUNISEA telecom tower at 100–120 m altitude, on lilac volcanic soil. S 19°03.214–300', E 178°09.836–877'. Dry evergreen microphyllous forest with emergent *Allocasuarina* trees, many creeping *Flagellaria* and with *Schizaea dichotoma* and Cyperaceae common in the ground layer. 14. Sept. 2003.

03308: Central part of KADAVU (Kandavu) Island. In the first bay E of VUNISEA on the southern coast, at 1–4 m altitude. S 19°02.940', E 178°10.005'. Coastal bush and *Barringtonia asiatica* forest with transitions to dry evergreen microphyllous *Allocasuarina* forest. 14. Sept. 2003.

03309: Western part of KADAVU (Kandavu) Island. 2 km NE of TAVUKI village, at 150–175 m altitude. On orange red volcanic soil. S 19°04.097–101', E 178°07.980'–08.249'. Dry evergreen microphyllous forest with emergent *Allocasuarina* trees, many creeping *Flagellaria* and with *Schizaea dichotoma* and Cyperaceae common in the ground layer. 15 Sept. 2003.

03310: Western part of KADAVU (Kandavu) Island. 3 km ENE of TAVUKI village, in a rocky streambed above waterfalls, at 120 m altitude. S 19°04.354', E 178°08.700'. Streamside rainforest with tree-ferns and many buttressed trees, on big boulders. 15. Sept. 2003.

08012: TAVEUNI Island, DES VOEUX (DEVO) peak, near PWD Weather Station, on the summit ridge at 1180-1190 m alt. S 16°50'27", W 179°57'32–59.5".

Hab.: Elfin forest dominated by *Cunonia* sp. 11 Apr. 2008

08013: TAVEUNI Island, NW slope of DES VOEUX (DEVO) peak, below PWD Weather Station, at 900-1100 m alt. S 16°50'18–28", W 179°57'57–58". Montane mossy forest. 11 Apr. 2008

08015: N end of TAVEUNI Island, coast near NAEANGAI village. , at 1–2 m alt. S 16°43'57", W179°51'22. Mangrove like forest dominated by *Heritiera litoralis.* Apr. 2008

08020: Central VITI LEVU, on the ridge of RAIRAIMATUKU Plateau, 15 km S of MONASAVU, at 924-960 m alt. S 17°48'43", E 178°02'06". Elfin forest with transition to mossy montane forest. 15 Apr. 2008

08023: Central VITI LEVU, RAIRAIMATUKU Plateau, on a summit with telecommunication tower, 16 km S of MONASAVU, at 1265 m alt. S 17°47'31", E 178°01'13.9". Elfin forest. 15 Apr. 2008

08028: Central VITI LEVU, on the ridge of RAIRAIMATUKU Plateau, 2 km E of MONASAVU Dam, on the SW side of a summit at 1050–1070 m alt. S 17°45'21", E 178°04'09". Shady, very wet elfin forest dominated by *Dicksonia brackenridgei*. 16 Apr. 2008

08029: Central VITI LEVU, RAIRAIMATUKU Plateau, NE side of a summit with telecommunication tower, 2 km E of MONASAVU Dam, at 1050 m alt. S 17°45'20", E 178°04'11". *Cyathea- Alpinia boia* elfin forest. 17 Apr. 2008

08032: Northern part of VITI LEVU Island. NADARIVATU Nature Reserve SW of Nadarivatu village, N of KORO'O summit at 920 m alt. S 17°34'05–10", E 177°56'55"-57'08". Mesic evergreen forest with *Podocarpus neriifolius, Decussocarpus* and *Agathis vitiensis*. 17 Apr. 2008

08033: Northern part of VITI LEVU Island. NAQUARANIBULUTI Nature Reserve 1 km E of NADARI-VATU village, along the track to Mt LOMALAGI, at 875 m alt. S 17°34'05", E 177°57'58". Mesic and dry evergreen forest with emergent *Podocarpus neriifolius* and *Agathis vitiensis*. 17. Apr. 2008

08034: Central VITI LEVU, RAIRAIMATUKU Plateau, near the FEA Station of MONASAVU Dam, along the road below the waterfalls, at 800 m alt., S 17°44'38", E 178°03'15". On naturalised *Piper* trees. 18 Apr. 2008

08035: Central VITI LEVU, RAIRAIMATUKU Plateau, at the SE end of the artificial MONASAVU Lake, around the FEA Station, at 790–800 m alt., S 17°44'39.5", E 178°03'10". On planted *Citrus* trees and ornamental shrubs. 19 Apr. 2008

08036: SE end of VITI LEVU Island, COLO I SUVA Forest Res. 9 km N from SUVA capital town, 1 km S of Raintreee Lodge, at 200 m alt. S 18°03'47", E 178°27'24". Lowland rainforest at flat parts dominated by *Pandanus*. 20 Apr. 2008

08037: VITI LEVU Island, Veivatuloa Province, Coral Coast 7 km N of LOMBAU, in Nambukavesi Valley along Namosi Road, at 80 m alt. Epiphylls in lowland rain forest. 22 Apr. 2008

08038: SE part of VITI LEVU Island. COLO-I-SUVA 10 km NNE of SUVA town, in the garden of Raintree Lodge, at 185 m alt. S 18°03.498', E 178°27.44'. On dead leaf fallen from canopy. 20. Apr. 2008.

Telopea 13(3) 495–502

Significant records of Fijian mosses

Allan J. Fife[1] and Alifereti Naikatini[2]

[1]*The Allan Herbarium, Landcare Research, PO Box 40, Lincoln 7640, New Zealand.*
[2]*Institute of Applied Science, Faculty of Science and Technology, University of the South Pacific, Private Bag, Laucala Campus, Suva, Fiji.*
Author for correspondence: fifea@landcareresearch.co.nz

Abstract

Information about recent collections of 17 taxa of Fijian mosses is presented. One new combination — *Calyptrochaeta subremotifolia* (Broth.) Fife — is made. Five species — *Calymperes schmidtii* Broth., *Dicnemon spathoideum* Duby, *Cryptogonium phyllogonioides* (Sull.) Isovita, *Distichophyllum cuspidatum* Dozy & Mölk., and *Calyptrochaeta subremotifolia* (Broth.) Fife — are newly recorded from Fiji. Four species — *Bryobrothera crenulata* (Broth. & Paris) Thér., *Trachyloma indicum* Mitt. var. *indicum*, *Distichophyllum graeffeanum* (Müll.Hal.) Broth., and *Daltonia contorta* Müll. Hal. — are newly recorded from Taveuni Island.

Introduction

The moss flora of the Fijian islands remains poorly documented and the scattered nature of the literature dealing with it remains an impediment to improving our understanding. The most useful catalogues are those for Melanesia (Schultze-Motel 1973) and the preliminary Fijian checklist (Whittier 1975). Arguably the most useful floristic treatments are those for (1) the Huon Peninsula of Papua New Guinea (Koponen & Norris 1983; the series partially indexed by Koponen et al. 1991), (2) the treatment of the Samoan mosses by Schultze-Motel (1974) and (3) the unfortunately incomplete 'Malesian Mosses' by Eddy (1988, 1990, 1996). The older but still very useful 'Mosses of the Philippines' (Bartram 1939) also describes and illustrates many taxa occurring in Fiji. A brief discussion of publications dealing specifically with Fijian collections is provided elsewhere (von Konrat et al. 2011, this issue). Other records are largely scattered among monographic or regional treatments (e.g. During 1977, Touw 2001).

The first author has collected material during three recent visits to Fiji. The first, in September 2006, permitted a modest number of collections to be made, mainly from the Suva and Naitasiri provinces of Viti Levu. The second, in April 2007, permitted joint collections from Namosi Province (including Mt Voma) and Suva Province of Viti Levu. The third, in April 2008, allowed collections from Tavua Province (including the western flank of Tomanivi/Mt Victoria), the Rairaimatuku Plateau in the Central

© 2011 Royal Botanic Gardens and Domain Trust ISSN0312-9764

Highlands of Viti Levu, and from Mt Des Voux and other sites on Taveuni Island. Additionally, we have been able to examine collections made by S. and T. Pócs in 2003 (mostly from the Rairaimatuku Plateau and Mt Des Voux).

A number of the collections made from these localities are of taxa previously unrecorded from the Fijian Islands or taxa poorly documented from Fiji. Study of certain collections also highlighted taxonomic difficulties that can perhaps only be resolved in the context of a regional revision or monograph. These records are presented here in the hope that they will spur further investigations on Fijian mosses.

Species collected

Calymperaceae

Calymperes schmidtii Broth.

Viti Levu: Suva Prov., Mt Korobamba, on lower slopes via track to summit from cement factory at Lami, partly shaded volcanic rock in moderately disturbed lowland rainforest (with *Spathodea, Ficus, Cyathea,* and *Dicksonia* conspicuous), c. 75 m elev., 18°05'S 178°23'E, *Allan Fife 12270* with *USP Workshop,* 19 Apr 2007 (CHR 595098, SUVA).

A new record for Fiji. The distribution and distinguishing features of this species are discussed by Eddy (1990: 110).

Syrrhopodon crocens Mitt.

Viti Levu: Namosi Prov., headwaters of the Nabukavesi R., c. 4 km from Nabukavesi Village on Namosi Rd, on large upper branches of recently fallen tree (*Trichospermum* sp.?) in dissected second-growth lowland rainforest dominated by *Trichospermum* and *Endospermum* and with numerous *Cyathea* and *Angiopteris* in understorey, c. 100 m elev., 18°07'S 178°13'E, *Allan Fife 12305* with *M. Tuiwawa*, 22 Apr 2007 (CHR 595130, SUVA).

Recorded by Dixon and Greenwood (1930) from a Graeffe collection from Ovalau Island. One Viti Levu locality from near Suva was recorded by Bartram (1936). Considered widespread in Malesia by Eddy (1990: 62), this species is recognised in part by the red pigmentation of its leaf bases.

Syrrhopodon tristichus Nees ex Schwägr.

Viti Levu: Namosi Prov., Mt Voma, on summit cone of Mt Voma via track starting at Namosi Village, on exposed vertical basalt rock face, in seepage with *Dicnemon spathoideum,* c. 800 m elev., 18°03'S 178°08'E, *Allan Fife 12414* with *Alivereti Naikatini*, 25 Apr 2007 (CHR 595239, SUVA).

This striking species is apparently recorded from Fiji only by Sullivant (1859) and Mitten (1861). However Mitten (1873) described *S. laevigatus* Mitt. with syntypes from Ovalau Island (*Milne*) and Samoa (*Powell*) and included '*S. tristichum* Mitt.' as a synonym. *Syrrhopodon laevigatus* Mitt. was subsequently recorded from Fiji by several authors, including Dixon and Greenwood (1930: 273) but the relationship between these taxa is not clear. Schultze-Motel (1973) retained both species in his catalogue. Bartram's (1936) *S. smithii* from Vanua Levu may prove to be synonymous. *Syrrhopodon tristichus* is considered by Eddy (1990: 80) to be 'widespread in the Indo-Pacific' and to occur throughout Malesia...[mostly] 'between c. 1000 and 2000 m alt.'

Dicnemonaceae

Dicnemon spathoideum Duby.

Viti Levu: Namosi Prov., Mt Voma, on summit cone via track starting at Namosi Village; on exposed vertical basalt rock face, in seepage with *Syrrhopodon tristichus*, 800 m elev., 18°03'S 178°08'E, *Allan Fife 12415* with *Alivereti Naikatini*, 25 Apr 2007 (CHR 595239, SUVA).

A new record for Fiji and apparently the first record of the species outside of New Caledonia (see Allen 1989: 262). This material differs from the New Caledonian specimens in CHR and NSW by two features. Firstly, the Mt Voma material has the branch leaves markedly spirally twisted in their upper portions. The tendency for spirally twisting is much less in New Caledonian material but is observable in *M.R. Crosby 14117* (CHR 412934). Secondly, the Mt Voma material is a striking red nearly throughout, while New Caledonian material is yellow-green. The strong red pigmentation of the Mt Voma collection is probably a result of its strongly insolated, epilithic, and irrigated habitat. Similar pigments have been seen in some populations of *Dicnemon* sect. *Dicnemon* in New Zealand. The accumulation of secondary pigments is a common response of many moss species to both irrigation and high levels of insolation. We have not seen type material of *D. spathoideum*.

Bryaceae

Brachymenium nepalense Hook.

Viti Levu: Naitasiri Prov., Qulewai and Monasavu Road Junction, on stem of dead liane in secondary forest in deeply incised stream gully, c. 700 m elev., 17°44'S 178°05'E, *Allan Fife 12155a* with *M. Tuiwawa*, 2 Sep 2006 (CHR 586994, SUVA); Central Highlands, Rairaimatuku Plateau, Monasavu area, c. 7 km S of Monasavu Dam, *Alphitonia–Homalium–Metrosideros–Scaveola–Cyathea* cloud forest with scattered emergent *Dacrydium*, on dead branch, 930 m elev., 17°49'S 178°02'E, *Allan Fife 12589*, 15 Apr 2008 (CHR 587950).

Previously recorded in Fiji only by Greenwood (1945) from Loma Lega Mountain near Nadarivatu Village, Viti Levu.

Cyrtopodiaceae

Bescherellia cryphaeoides (Müll.Hal.) M.Fleisch.

Viti Levu: Namosi Prov., Mt Voma, track to summit starting at Namosi Village, on dry vertical basalt in mid-elevation rainforest with *Agathis, Trichospermum, Endospermum*, and *Dendrocnide* common in canopy and numerous *Ficus* spp., *Cyathea* spp., and *Dillenia biflora* in understorey, very steep (c. 45°) slope with numerous small cascading streams and small waterfalls and seepages (after recent rain), c. 700 m elev., 18°03'S 178°08'E, *Allan Fife 12383* with *Alivereti Naikatini*, 25 Apr 2007 (CHR 595207, SUVA).

Recorded by Dixon and Greenwood (1930: 282) from a single uncertain collection from Ovalau (*Graeffe*). Recorded from Vanua Levu by Bartram (1936: 12) and by Greenwood (1945: 215) from Nadarivatu, Viti Levu. This appears to be an uncommon species in Fiji.

Pterobryaceae

Trachyloma indicum Mitt. var. ***indicum.***

Taveuni Island: Mt Des Voux, near start of track to Tagimaucia Lake, epiphytic on *Scaveola*; c. 1180 m, 16°50'S 179°58'W, *Allan Fife 12527,* 10 Apr 2008 (CHR 587974); **Viti Levu:** Central Highlands, Rairaimatuku Plateau, Monasavu area, c. 7 km S of Monasavu Dam, *Alphitonia–Homalium–Metrosideros–Scaveola–Cyathea* cloud forest with scattered emergent *Dacrydium*, on caudex of *Cyathea*, with *Spiridens aristifolius*, 930 m elev., 17°49'S 178°02'E, *Allan Fife 12589*, 15 Apr 2008 (CHR 587973).

A new record for Taveuni Island. The only previous Fijian records are one record each from Vanua Levu and Viti Levu (Tomanivi) by Miller and Manuel (1982), who also record this widespread species from Samoa.

Phyllogoniaceae

Cryptogoniuм phyllogonioides (Sull.) Isovita.

Viti Levu: Namosi Prov., Mt Voma, on track starting at Namosi Village; trunk of small dead tree in mid-elevation rainforest on very steep slope, 500 m elev., 18°03'S 178°08'E, *Allan Fife 12367* with *Alivereti Naikatini*, 25 Apr 2007 (CHR 595191, SUVA).

A new record for Fiji.

Symphysodontaceae

Chaetomitrium rugifolium (Sull.) Mitt.

Viti Levu: Namosi Prov., Wainikatama Stream, c. 5 km SE of Namosi Village on Namosi Rd; on stem of melastome shrub at grazed margin of swift, bouldery, and clear stream in lowland rainforest with *Agathis, Trichospermum,* and *Endospermum* in canopy, and *Cyathea* spp. *Ficus* spp. and *Dillenia biflora* in understorey; basalt bedrock, 380 m elev., 18°01'S 178°10'E, *Allan Fife 12335* with *Alivereti Naikatini*, 24 Apr 2007 (CHR 595159, SUVA). **Taveuni Island:** Mt Des Voux, pendent from branches of understorey rubiaceous shrub in primary rainforest, 750 m elev., 16°50'S 179°58'W, *Allan J. Fife 12548*, 10 Apr 2008 (CHR 587951).

Of the two species of this genus recorded for Fiji by Dixon and Greenwood (1930), we have assigned material to this species, which Mitten (1873: 392) recorded from 'Viti' (presumably Viti Levu) and from Ovalau. No herbarium material for critical comparison was available. We have been influenced by the markedly rugose leaves. Schultze-Motel (1974) recorded this species from Samoa (as *C. rugosum* W.Schultze-Motel, *nom. inval.*) Schultze-Motel (1973) listed three other species of *Chaetomitrium* from Fiji, all on the basis of reports by Bartram.

Pilotrichaceae

Cyclodictyon blumeanum (Müll.Hal.) Kuntze.

Viti Levu: Central Highlands, Rairaimatuku Plateau, Monasavu area, headwaters of Waikuru Creek, on basalt in cascading forest stream, subject to periodic flooding, 870 m elev., 17°49'S 178°02'E, *Allan Fife 12663*, 16 Apr 2008, CHR 587952, SUVA); Tavua Prov., Northern Highlands, western flank of Tomanivi (Mt Victoria), on track from Navai Village, on damp basalt bedrock in gully of forest rivulet, mid-elevation rainforest, 1050 m elev., 17°37'S 178°01'E, *Allan Fife 12718* with *E. Namatalau*, 18 Apr 2008 (CHR 587953, SUVA).

This species has been previously recorded from the Monasavu area by Matsui and

Iwatsuki (1993), from one Ovalau locality and two Viti Levu localities by Dixon and Greenwood (1930: 289) and from one Vanua Levu locality by Bartram (1936: 16).

Adelotheciaceae

Bryobrothera crenulata (Broth. & Paris) Thér.

Taveuni Island: NE side of Mt Des Voux, corticolous in 4–8 m tall elfin forest, 1040–1150 m elev., *S. & T. Pócs 3279/Y*, 16°50'S 179°58'W, 27 Aug 2003 (CHR 587972, EGR). Det. by G. Kis of EGR.

A new record for Taveuni Island; this appears to be the third Fijian record. Bartram (1936: 9) described *Calomnion dixonii* from the summit of Tomanivi/Mt Victoria and subsequently reduced it to synonymy under *Bryobrothera crenulata* (Bartram 1953). Norris and Robinson (1979) also recorded this species from Tomanivi at an elevation of between 800 and 1000 m. They reviewed the then current knowledge of this iconic genus, described its previously unknown sporophyte and concluded that it belonged in the Hookeriaceae *sensu* Brotherus rather than to the Rhizogoniaceae. Buck and Goffinet (2000) have more recently assigned it to the segregate family Adelotheciaceae. This species was known for nearly a half-century only from New Caledonia following its original description, but Norris and Robinson (1979) recorded its range to include northern Queensland (where it is 'apparently an abundant moss growing primarily on twigs and small branches in ridge top rainforest'), Fiji, and the Solomons. Tan and Koponen (1989) subsequently recorded it from Mindanao Island in the Philippines.

Daltoniaceae

Daltonia contorta Müll. Hal.

Taveuni Island: NW slope of Mt Des Voux, on decaying bark in mossy elfin forest very rich in epiphytes, 1040–1150 m elev. 16°50'S 179°58'W, *S. & T. Pócs 3279/AD*, 27 Aug 2003 (EGR); **Viti Levu:** Central Highlands, Rairaimatuku Plateau, Monasavu area, c. 7 km S of Monasavu Dam, on woody *Piper* sp. at margin of cloud forest, 930 m elev., 17°49'S 178°02'E, *Allan Fife 12603*, 15 Apr 2008 (CHR 587977); Central Highlands, Rairaimatuku Plateau, Monasavu area, c. 5 km S of Monasavu Dam, on damp *Coriaria* trunk at margin of 4WD track through cloud forest, 1180 m elev., 17°49'S 178°02'E, *Allan Fife 12624*, 15 Apr 2008 (CHR 587976).

A new record for Taveuni Island. Recorded by Bartram (1950: 30) from Viti Levu and by Matsui and Iwatsuki (1993) from Viti Levu (Tomanivi) and Vanua Levu. The stout leaf border (c. 60 µm and c. 10 cells wide) at the widest part of the leaf, the plane leaf margins and the strongly twisted dry leaves necessitate referral to this species. Matsui and Iwatsuki (1993) list the distribution as 'India, Sri Lanka, Java, Vietnam, Philippines, New Guinea, Fiji, and Hawaii'.

Distichophyllum cuspidatum Dozy & Mölk.

Taveuni Island: NW slope of Mt Des Voux, ramicolous in montane rainforest rich in epiphytes, 600–700 m elev., 16°50'S 179°58'W, *S. & T. Pócs 03288/Q*, 1 Sep 2003 (CHR 587955, EGR); Mt Des Voux, near start of track to Tagimaucia Lake, caudex and rachis of dead *Cyathea* frond, 1170 m, 16°50'S 179°58'W, *Allan Fife 12538*, 10 Apr 2008 (CHR 587956); **Viti Levu:** Naitasiri Prov., Qulewa and Monosavu Road Junction 17°44'S 178°05'E, on roots of *Piper aduncum* in deeply incised stream gully; c. 700 m elev., *Allan Fife 12150* with *M. Tuiwawa*, 2 Sep 2006 (CHR 586990); Tavua Prov., Northern Highlands, western flank of Tomanivi (Mt Victoria), on track from Navai Village, epiphytic on *Piper* in mid-elevation rainforest, 1050 m elev., 17°37'S

178°01'E, *Allan Fife 12720* with *E. Namatalau*, 18 Apr 2008 (CHR 12720); Namosi Prov., Namosi Rd, c. 8 km NW of Queens Rd, on dead woody stem in hyper-moist lowland rainforest of stream gully, 80 m elev., 18°07'S 178°11'E, *Allan Fife 12785*, 22 Apr 2008 (CHR 587958).

A new record for Fiji. This species is widespread in Malesia and recorded from Sri Lanka (Bartram, 1939), the Society Islands and Micronesia (Whittier 1976: 281). Given the number of collections from a broad elevational range, it is possible that one of the other *Distichophyllum* spp. recorded from Fiji will prove to be a regional synonym.

Distichophyllum graeffeanum (Müll.Hal.) Broth.

Taveuni Island: near summit of Mt Des Voux, 1190 m elev., 16°50' S 179°58' W, *Allan Fife 12544*, 10 Apr 2008 (CHR 587959, SUVA); NE side to Mt Des Voux, in 4–8 m tall elfin forest, 1040–1150 m elev., *S. & T. Pócs 3279/AJ*, 16°50'S 179°58'W, 27 Aug 2003 (CHR 587961, EGR); **Viti Levu:** Central Highlands, Rairaimatuku Plateau, Monasavu area, c. 7 km S of Monasavu Dam, *Alphitonia–Homalium–Metrosideros–Scaveola–Cyathea* cloud forest with scattered emergent *Dacrydium*. 930 m elev., 17°49'S 178°02'E, *Allan Fife 12595*, 15 Apr 2008 (CHR 587960); Central Highlands, NE edge of Rairaimatuku Plateau, above Naqelewai Village, montane mossy cloud forest, 855–945 m elev., *S. & T. Pócs 3273/K*, 24 Aug 2003 (CHR 587962, EGR).

A new record for Taveuni Island. Several other collections from nearby localities have also been seen. Previously recorded from Viti Levu by Dixon and Greenwood (1930: 288) on the basis of a Graeffe collection which is presumably the type. Müller's (1874) earlier report is based on the same collection. Also recorded by Gepp (1909, quoted by Schultze-Motel 1973) from an unspecified locality and from Namosi Forest by Matsui and Iwatsuki (1993). The differences between the Fijian *D. graeffeanum* and Javanese *D. osterwaldii* are not clear. Brotherus (1925: 230) suggests that these species may differ by their sexuality, the nature of their dry leaves, and ill-defined differences in the ornamentation of the setae and calpytra (with *D. graeffeanum* being autoicous, with the dry leaves merely wavy and crenulate; the setae spinose, and the calyptra papillose to spinose). The Malesian name *D. undulatum* Dozy & Mölk. may also be relevant here. Of these species, only *D. graeffeanum* has been recorded from Fiji (*fide* Schultze-Motel 1973) and it is appropriate to employ this regional name until a thorough taxonomic revision is published.

Calyptrochaeta subremotifolia (Broth.) Fife, **comb. nov.**

Basionym: *Eriopus subremotifolius* Broth., Denkschr. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. 84: 395 (1908).

Taveuni Island: Mt Des Voux, forming turf of c. 1 m^2 on gravel and weathered basalt in bed of intermittent streamlet, 750 m elev., 16°50'S 179°58'W, *Allan Fife 12553*, 10 Apr 2008 (CHR 587963, SUVA); **Viti Levu:** on the ridge of Rairaimatuku Plateau, 10 km SSE of Navai, corticolous in mossy elfin cloud forest, 990–1010 m. elev., 17°43'S 178°02' E, *S. & T. Pocs 3274/P*, 24 Aug 2003 (EGR, CHR 587965); Central Highlands, Rairaimatuku Plateau, c. 2 km NE of Monasavu Dam, on dead standing *Ficus* stem in highly disturbed and adventive forest, 920 m elev., 17°45'S, 178°04'E, *Allan Fife 12677*, 16 Apr 2008 (CHR 587964).

A new record for Fiji and previously recorded only from Samoa. The leaf border here is mostly 2 cells wide. We have little herbarium material for comparison. The differences between *C. subremotifolia* and *C. remotifolia* (widespread in Malesia, but also apparently unreported from Fiji) appear to be slight, with Schultze-Motel (1974: 389, as *Eriopus*) stating that *C. subremotifolia* has borders of "nur etwa 2 Zellen breiten" while *C. remotifolia* has borders of 3–5 cell rows. A Samoan specimen available for

comparison (CHR 349133) has more weakly developed costae and more slender leaf apices than the Fijian.

Sematophyllaceae

Meiothecium hamatum (Müll.Hal.) Broth.

Viti Levu: Central Highlands, Rairaimatuku Plateau, c. 6 km S of Monosavu Dam, near Madelidovukula Peak, on *Coriaria* with *Macromitrium* sp., at margin of road through *Podocarpus–Cyathea–Metrosideros–Alpinia* cloud forest, 1100 m elev., 17°49'S 178°02'E, *Allan Fife 12608,* 15 Apr 2008 (CHR 587969); Central Highlands, Rairaimatuku Plateau, Monosavu Dam Depot site; epiphytic on ornamental shrub, c. 800 m elev., 17°49'S 178°02'E, *Allan Fife 12631*, 16 Apr 2008 (CHR 587970); NE edge of Rairaimatuku Plateau, above Naqelewai Village, ramicolous in montane mossy cloud forest, 855–945 m elev., *S. & T. Pócs 3273/O*, 24 Aug 2003 (CHR 587971, EGR).

Previously recorded from two Fijian sites at comparable elevations in Namosi Prov. by Bartram (1936: 19). *Meiothecium hamatum* is distinct by its reflexed leaf apices from congeners that have been recorded from Fiji.

Trismegistia rigida (Müll.Hal.) Broth.

Viti Levu: Suva Prov., Colo-i-Suva Forest Park, vicinity of 'upper pools' of Waisila Creek, on exposed root in very wet gorge of cascading stream in modified lowland rain forest, 120–180 m elev., 18°04'S, 178°28'E, *Allan Fife 12399*, 29 Apr 2007 (CHR 595223, SUVA).

This is a common species at this site. Although apparently widespread in the Pacific, this species is recorded from only one unspecified Viti Levu site by Mitten (1873) on the basis of a Milne collection. This record is also quoted by Dixon and Greenwood (1930: 298). Only one other record of a *Trismegistia* is cited from Fiji by Schultze-Motel (1973).

Acknowledgments

AJF thanks Marika Tuiwawa and the staff of the USP herbarium for sharing their knowledge of the Fijian flora and culture, and for their excellent hospitality. We thank Marika, John Braggins, Elizabeth Brown, Matt von Konrat, Thorsten Lumbsch, Tamás Pócs and Matt Renner for their company in the field, sometimes under trying physical conditions. Tamás Pócs kindly allowed us to study Fijian collections he made, with his wife, in 2003. Some of these collections had been previously examined by G. Kis at EGR. The curators at EGR and NSW kindly provided loans. We thank David Glenny and Rod Seppelt for helpful comments on a draft of this paper and Christine Bezar for editorial assistance. Grant Hunter and Ilse Breitwieser provided support to AJF in various ways. AJF's 2006 and 2007 visits to Fiji were largely funded by NZAid (Government Agencies Contestable Fund), while his 2008 visit was funded by the National Geographic Committee for Research and Exploration (Grant No. 8247-07 awarded to Matt von Konrat).

References

Allen BH (1989) The genus *Dicnemon* (Musci: Dicnemonaceae) in New Caledonia. *Hikobia* 10: 245–267.

Bartram EB (1936) Contribution to the mosses of Fiji. *Occasional Papers of the Bernice P. Bishop Museum* 11: 1–30.

Bartram EB (1939) Mosses of the Philippines. *Philippine Journal of Science* 68: 1–437, pl. 1–29. (Reprinted by Koeltz, 1972)

Bartram EB (1950) Additional Fijian Mosses II. *Occasional Papers of the Bernice P. Bishop Museum* 20: 27–33.

Bartram EB (1953) New Caledonian mosses collected by Dr. O.H. Selling. *Botaniska Notiser* 1953: 197–203.

Brotherus VF (1924–1925) Musci. In Engler A & Prantl K (eds) *Die natürlichen Pflanzenfamilien*, ed. 2. 2 vols. Bd. 10, 1924, pp. 143–478; Bd. 11, 1925 (Engelmann: Leipzig)

Buck WR & Goffinet B (2000) Morphology and classification of mosses. Pp. 71–123 in Shaw AJ & Goffinet B (eds) *Bryophyte biology*. (Cambridge University Press, Cambridge)

Dixon HN & Greenwood W (1930) The Mosses of Fiji. *Proceedings of the Linnean Society of New South Wales* 55(3): 261–302; pls viii–ix.

During HJ (1977) A taxonomical revision of the Garovaglioideae (Pterobryaceae, Musci). *Bryophytorum Bibliotheca* 12: 1–244.

Eddy A (1988) *A handbook of Malesian mosses*, vol. 1 *Sphagnales to Dicranales*. (Natural History Museum Publications, London)

Eddy A (1990) *A handbook of Malesian mosses*, vol. 2 *Leucobryaceae to Buxbaumiaceae*. (Natural History Museum Publications: London)

Eddy A (1996) *A handbook of Malesian mosses*, vol. 3 *Splachnobryaceae to Leptostomataceae*. (Natural History Museum and HMSO: London)

Greenwood W (1945) Notes on some Fijian mosses. *Proceedings of the Linnean Society of New South Wales* 70: 213–218.

Koponen T & Norris DH (1983) Bryophyte flora of the Huon Peninsula, Papua New Guinea. I. Study area and its bryological exploration. *Annales Botanici Fennici* 20: *15–29*.

Koponen T, Piippo S & Norris DH (1991) Bryophyte flora of the Huon Peninsula, Papua New Guinea. XLVII. Generic and family indexes to parts I–XLVI. *Acta Botanica Fennica* 143: 107–111.

Matsui T & Iwatsuki Z (1993) Callicostaceae and Daltoniaceae (Hookeriales, Musci) from Fiji and Vanuatu. *Hikobia* 11: 281–284.

Miller NG & Manuel MG (1982) *Trachyloma* (Bryophytina, Pterobryaceae): a taxonomic monograph. *Journal of the Hattori Botanical Laboratory* 51: 273–321.

Mitten W (1861) Musci et Hepaticae Vitiensis. *Bonplandia* 9: 365–367.

Mitten W (1873) Musci. Pp. 378–404 in Seemann B *Flora Vitiensis*. (London)

Müller C (1874) Music polynesiaci praesertim Vitiani et Somoani Graeffeani. *Journal des Museum Godeffroy* 3 (6): 51–90.

Norris DH & Robinson H (1979) The systematic position of *Bryobrothera crenulata*. *Bryologist* 82: 305–309.

Schultze-Motel W (1973) Katalog der Laubmoose von Melanesien. *Willdenowia* 7: 47–82.

Schultze-Motel W (1974) Die Moose der Samoa-Inseln. *Willdenowia* 7: 333–408.

Sullivant W (1859) Musci. Pp. 1–112 in *United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842 under the command of Charles Wilkes, U.S.N.* vol. 17.

Tan BC & Koponen T (1989) Additions and corrections to the Philippine moss flora. *Cryptogamie, Bryologie Lichenologie* 10: 235–245.

Touw A (2001) A taxonomic revision of the Thuidiaceae (Musci) of tropical Asia, the western Pacific, and Hawaii. *Journal of the Hattori Botanical Laboratory* 91: 1–136.

von Konrat M, Naikatini A, Tuiwawa M, Söderström L, Fife A, Renner M, Brownsey P, Perrie L, Hagborg A, Pócs T, Lumbsch HT, Braggins J, Séneca A & Brown E (2011) A brief history of the cryptogams of Fiji and prospects for the future. *Telopea* 13: 361–374.

Whittier HO (1975) A preliminary list of Fijian mosses. *Florida Scientist* 38(2): 85–106.

Whittier HO (1976) *Mosses of the Society Islands*. (University Presses of Florida: Gainesville, FL)

Manuscript received 25 January 2011, accepted 11 August 2011

Telopea 13(3) 503–511

Sphagnum of the Pacific — a checklist

Ana Séneca[1,2] and Lars Söderström[1]

1Department of Biology, Norwegian University of Science and Technology, N-7491 Trondheim, Norway
2Department of Biology, Fac. Ciências Univ. Porto, Rua Campo Alegre, S/N, P- 4169-007 Porto, Portugal

Abstract

Six species of *Sphagnum* are recorded for the Pacific and the origin of another, *Sphagnum seemannii* var. *weberi* supposed to come from Samoa, is questioned. Five species are rejected from the area due to recent taxonomic work. *Sphagnum* is only recorded from Fiji, Hawaii and New Caledonia, in addition to the questionable report from Samoa. The occurrences of *Sphagnum* are restricted to larger, older islands, with enough precipitation for a cloud forest type of vegetation and to those islands with high altitude crater lakes.

Introduction

The *Sphagnum* flora of the Pacific (sensu Brummitt 2001; Fig. 1) has not received much attention and many reports are old. The Hawaiian archipelago is the only relatively well studied area in the region with several recent bryological collections. New Caledonia has also received some recent attention while Fiji and Samoa (and most other islands in the Pacific) have received very little recent attention (cf. von Konrat et al. 2011).

The most recent list with distribution data including *Sphagnum* in the Pacific region is by Miller et al. (1978). They report eight taxa from Fiji, New Caledonia, Hawaii and Samoa and no *Sphagna* are recorded for any other islands in the Pacific. Of the taxa they report, we treat two in a narrower sense, *S. compactum* as *S. wheeleri* and *S. cristatum* as *S. leratianum* (both of which they had included as synonyms). We treat *S. seemanii* as a synonym of *S. cuspidatum* var. *subrecurvum* as per Eddy (1977) and question the origin of the original specimen of *S. seemannii* var. *weberi*. Finally we show that *S. reichardtii* never has been found in the region.

The Pacific *Sphagnum* taxa belong to four of the commonly accepted sections of the genus: sect. *Sphagnum* (*S. leratianum, S. palustre, S. vitjianum*), sect. *Rigida* (*S. wheeleri*), sect. *Cuspidata* (*S. cuspidatum*) and sect. *Subsecunda* (*S. novo-caledoniae*). According to the present taxonomic treatment four of the species are endemic: *S. leratianum* and *S. novo-caledoniae* to New Caledonia, *S. vitjianum* to Fiji and *S. wheeleri* to Hawaii. However, *S. leratianum* and *S. vitjianum* are probably conspecific with more widespread taxa (see notes below).

© 2011 Royal Botanic Gardens and Domain Trust ISSN0312-9764

Sphagnum peatlands in the Pacific are generally small compared to those in the boreal regions. With the exception of *S. palustre* in the Kohala mountains of Hawaii, where it forms mats in restricted montane bog communities, *Sphagnum* in this region generally grows immersed at the edge of lakes and in swamps (Bartram 1936) or on shaded to partially shaded moist rocks or silty soils, near streams in forested valleys (Iwatzuki 1986). In most cases *Sphagnum* occurs above 500 m altitude on the windward slopes where high orographic rainfall and low evapotranspiration rates prevents the occurrence of prolonged annual dry seasons (Whinam et al. 2003). *Sphagnum* is absent from many islands of the Pacific due to their small area and lack of habitat. However, dispersal constraints can probably explain its absence from islands with adequate age, area, altitude and precipitation pattern as shown by the different *Sphagnum* floras of the islands of Maui and Hawaii (Karlin & Andrus 1995). Combination of adequate altitude and rainfall exists in the Marquesas archipelago (islands of Hivoa and Fatuhuku) (Whittier 1973). Upolu (Samoa) and some of the crater lakes on Vanuatu islands also seem possible for *Sphagnum* due to their altitude, pH, depth and surrounding vegetation, yet no species have been reported from there (Schabetsberger et al. 2009).

Methodology and materials

This checklist is arranged in alphabetic order. The list is in three parts, i) accepted reports, ii) doubtful reports, iii) excluded taxa. Finally, a list of all synonyms connected to reports from the Pacific is provided.

Each accepted taxon is qualified using a four level ranking system that indicates our level of confidence about a taxon's value. The coding convention is outlined in detail by von Konrat et al. (2010). Briefly,

? = problem with the taxon name (invalid, illegitimate, orphaned);

* = serious doubts about the value of the taxon;

** = probably a good taxon;

*** = accepted, a good taxon as currently understood.

We distinguish between first hand reports ("A report citing a specimen or an observation of material either in the field 'and then locality fairly exact' or among collected specimens") using bold font and second hand reports, ("Merely citing a locality that is not exact enough to be searched for the species, and not apparently based on a specimen that can be found"), using normal font (cf. von Konrat et al. 2010). The list includes all types coming from the Pacific region as defined by Brummitt (2001).

There are reports of *Sphagnum* from New Caledonia (NWC), both from the north and the south provinces (NWC-NO and NWC–SO); from Fiji (FIJ), Ovalau (FIJ-OV), Taveuni (FIJ-TA) and Viti-Levu (FIJ-VI); Hawaii (HAW), Hawaii I (HAW-HA), Maui (HAW-MA) and Oahu (HAW-OA); and from Samoa (SAM).

The occurrence of species in the Pacific and on each of the islands where *Sphagnum* has been recorded is shown in Table 1. Of the 12 taxa that have been reported to occur on these islands we accept six, question the occurrence of *S. seemannii* var. *weberi* on Samoa as well as its taxonomic value and reject five taxa from the area. See further notes under each taxon.

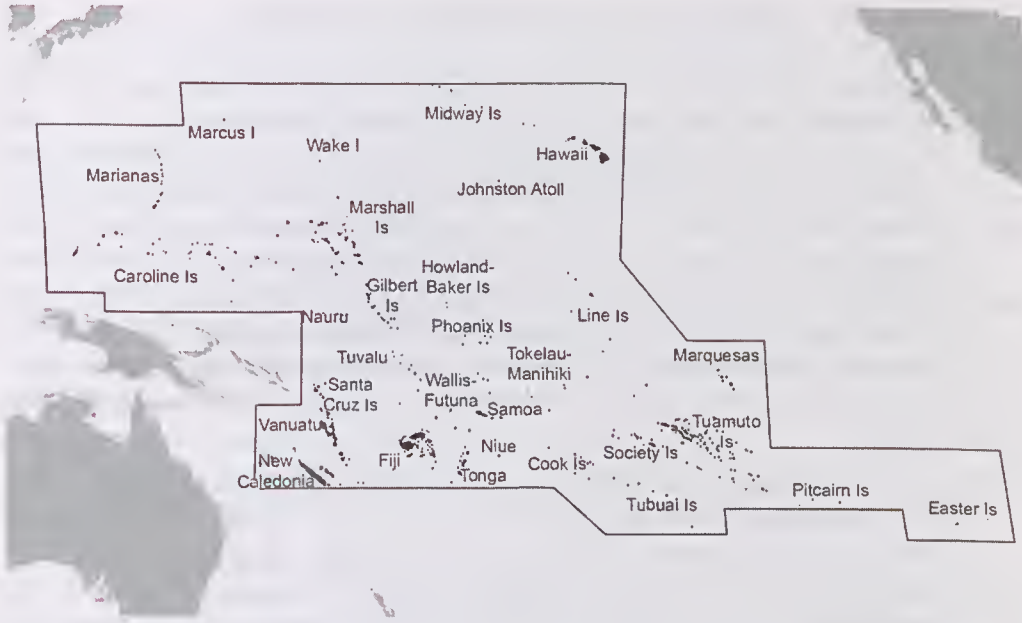

Fig. 1. Outline of the Pacific region as defined by Brummit et al. 2001.

Table 1. *Sphagnum* taxa reported from the Pacific Islands.

Abbreviations: FIJ – Fiji; OV – Ovalau; TA – Taveuni; VI – Viti Levu; HAW – Hawaii; HA – Hawaii Island; MA – Maui; OA – Oahu; NWC – New Caledonia; NO – New Caledonia North province; SO – New Caledonia South province. – rejected taxon; •, ○ – first hand report (species and subtaxa, respectively); ? doubtful collection site; () – introduced.

	Pacific	Fiji				Hawaii				New Caledonia			Samoa
		FIJ	OV	TA	VI	HAW	HA	MA	OA	NWC	NO	SO	SAM
S. compactum	—					—		—					
S. cristatum	—									—			
S. cuspidatum	•	•	•	•		—		—		—			—
- subsp. *cuspidatum*	—												
-subsp. *subrecurvum*	○	○	○	○									
S. henryense	—					—							
S. leratianum	•											•	
S. novo-caledoniae	•									•	•	•	
S. palustre	•	—			—	•	•		(•)				
S. perichaetiale	—	—				—				—			
S. reichardtii	—	—			—								
S. seemanii var. *weberi*	?												?
S. vitjianum	•	•				—							
S. wheeleri	•					•		•					

Sphagnum taxa occurring in the Pacific

*** *S. cuspidatum* Ehrh. ex Hoffm. PACIFIC: Wijk & Margadant 1967 as *S. capillaceum* var. *cuspidatum*, Wijk & Margadant 1967 as *S. palustre* var. *cuspidatum*, Wijk & Margadant 1967 as *S. capillifolium* var. *cuspidatum*, Wijk & Margadant 1967. FIJ: **Mitten 1861**, **Mitten 1873**. NWC: Miller et al. 1978, Pursell & Reese 1982, Whinam & Hope 2005, Thouvenot & Bardat 2010. HAW-MA: Miller et al. 1978 rejected previous reports as *S. compactum*. **NOTE:** 1) We are not aware of any first hand reports of *S. cuspidatum* or any of its infrataxa from New Caledonia prior to Miller et al. (1978). 2) We do not know on what Miller et al. (1978) based their statement on the occurrence in Hawaii of *S. cuspidatum* and we do not think it has ever been recorded from there.

** — subsp. *subrecurvum* (Warnst.) A.Eddy PACIFIC: Wijk & Margadant 1967 as *S. seemannii*. FIJ: Müller 1874 as *S. seemannii* ["*seemanni*"], Warnstorf 1901 as *Sphagnum seemannii* ["*seemanni*"], Paul 1924 as *S. seemannii*, Schultze-Motel 1973a as *S. seemannii*, Whittier 1975 as *S. seemannii*, FIJ-OV: **TYPE** of *S. seemannii*, **Müller 1874** as *S. seemannii* ["*seemanni*"], **Warnstorf 1911** as *S. seemannii*, Dixon & Greenwood 1930 as *S. seemannii*, FIJ-TA: **Bartram 1936** as *S. seemannii* ["*seemanii*"], **Eddy 1977**, Miller et al. 1978 as *S. seemannii*, Whinam & Hope 2005 as *S. seemannii*. SAM: Paul 1924 as *S. seemannii*, Whinam & Hope 2005 as *S. seemannii*. **NOTE:** All reports from Samoa refer to *S. seemannii* var. *weberi* that we here exclude from the synonymy of *S. cuspidatum* (see below). *S. cuspidatum* should thus be rejected from Samoa until it is clear that this variety also belongs to *S. cuspidatum*.

* *S. leratianum* Paris et Warnst. PACIFIC: Wijk & Margadant 1967. NWC: Paul 1924 ["*Le Ratianum*"], NWC-SO: **TYPE, Brotherus 1911a, Warnstorf 1911** ["*Le Ratianum*"]. NOTE: This taxon has sometimes been synonymised with *S. perichaetiale* (Eddy 1977, Crum 1984) and sometimes with *S. cristatum* (Wijk & Margadant 1967, Whinam 2003, Whinam & Hope 2005), possibly following Andrews (1951) who discussed its relationships with other taxa in sect. *Sphagnum*. We have not studied it, so we recognise it for now, assuming that it will be synonymised when studied further. It is currently only reported from New Caledonia.

*** *S. novo-caledoniae* Paris et Warnst. PACIFIC: Wijk & Margadant 1967. NWC: Paul 1924, Miller et al. 1978, Pursell & Reese 1982, Whinam & Hope 2005, Thouvenot & Bardat 2010, NWC-NO: **SYNTYPE, Warnstorf 1911, Iwatsuki 1986**, NWC-SO: **LECTOTYPE, Brotherus 1911a**, ["*Novae Caledoniae*"] **Warnstorf 1911, Eddy 1977, Iwatsuki 1986.**
Endemic to New Caledonia.

*** *S. palustre* L. PACIFIC: Wijk & Margadant 1967 as *S. lonchocladum*, Wijk & Margadant 1967 also as *S. cymbifolium*, *S. antarcticum* var. β *lonchocladum*, McQueen et Andrus 2006. FIJ: Andrews 1951 [with *S. vitianum* as a synonym], Gangulee 1969, Schultze-Motel 1973 [with *S. vitjianum* as a synonym], ?Sharp et al. 1994, FIJ-VI: Miller et al. 1978 [with *S. vitianum* as a synonym],

Whinam & Hope 2005. HAW: **TYPE** of *S. lonchocladum*, Müller 1896a as *S. lonchocladum*, Andrews 1951, Schultze-Motel 1962, Gangulee 1969, Crum 1980, Crum 1984, Sharp et al. 1994, Whinam & Hope 2005, HAW-HA: **Bartram 1942, Degener et al. 1969**, Hoe 1978, **Karlin & Andrus 1995** also as *S. henrycuse* Warnst., Staples et al. 2004, **Waite 2007**, HAW-OA: Miller et al. 1978, **Karlin & Andrus 1995, Karlin 2001** [introduced from Hawaii I. in the 1960's], Waite 2007 ["Introduced as it was used as bedding for forestry seedlings"]. **NOTE:** 1) All reports from Fiji are due to the inclusion of *S. vitjianum* as a synonym and have to be rejected. 2) *S. heuryense* has been reported from Hawaii, but later rejected as a misidentification of *S. palustre* (Karlin 2001, Staples et al. 2004, Waite 2007). Recently, Karlin et al. (2010) showed that *S. henryense* and *S. palustre* are conspecific using microsatellite data. However, they did not include any specimens from the Pacific area in the analysis. If the Hawaiian material cannot be included in *S. palustre* s.l., but proves to be a species in its own right, then the correct name would be *S. lonchocladum* Müll.Hal. (Karlin 2001).

* *S. vitjianum* Schimp. ex Warnst. PACIFIC: Wijk & Margadant 1967, FIJ: **TYPE**, Warnstorf 1901 ["*vitianum*"], Paul 1924 ["*vitianum*"], Dixon & Greenwood 1930, Whittier 1975, HAW-OA: Hoe 1978. **NOTE:** 1) *S. vitjianum* is sometimes treated as a synonym of *S. palustre* (Andrews 1951) and sometimes of *S. perichaetiale* (Eddy 1977) and Karlin (2001) mentions that it is "either *S. perichaetiale* or a closely related species". We prefer to keep it as an accepted taxon until further studies clarify its status. 2) All reports of *S. vitjianum* from Hawaii are rejected as *S. palustre* (Karlin & Andrus 1995, Karlin 2001, Staples et al. 2004). See note under *S. palustre*.
Endemic to Fiji.

** *S. wheeleri* Müll.Hal. PACIFIC: Wijk & Margadant 1967 also as *S. whecleri* var. *vulcanicum*, *S. rigidulum* and *S. vulcanicum*. HAW: **TYPE** of *S. rigidulum*, **TYPE, Müller 1887, Warnstorf 1890** as *S. rigidulum*, Müller 1896a, Warnstorf 1901 also as *S. vulcanicum*, Paul 1924, HAW-MA: **TYPE** of *S. vulcanicum*, **Warnstorf 1900** as *S. vulcanicum*, **Degener et al.** 1969, **Karlin & Andrus 1995, Karlin 2001**, Staples et al. 2004.
Endemic to Hawaii.

Taxa doubtfully occurring in the Pacific

? *S. seemannii* Müll.Hal. var. *weberi* (Warnst.) Warnst. PACIFIC: Wijk & Margadant 1967 also as *S. weberi*. SAM: **TYPE** of *S. weberi*, **Warnstorf 1890** as *S. webcri*, Schultze-Motel 1973a, Miller et al. 1978. **NOTE:** *S. seemannii* is a synonym of *S. cuspidatum* subsp. *subrecurvum* (Eddy 1977) but it is unclear what var. *weberi* is. The type of *S. weberi* was reported from "Samoa, am See 'Draunu' zwischen Gleichenien circa 1400 m hoch im September 1881 leg. Weber" (Warnstorf 1890) but neither Schultze-Motel (1973a) nor we have been able to find a locality on Samoa that it could come from. In fact, only the island of Savai'i is high enough for the report, but that island does not have any lakes above 1300 m. We have not been able to find where Weber collected in 1881 and

where there could possibly be a locality like this. However, we are rather sure that it is not on Samoa and would guess that is in New Guinea as both Samoa and part of New Guinea were German colonies at this time.

Taxa rejected from the Pacific

*** *S. compactum* Lam. et DC. PACIFIC: Séneca & Söderström 2009, HAW: Crum 1986, Hill et al. 1992, Fife 1996, HAW-MA: Miller et al. 1978, Crum 1984. **NOTE:** Karlin (2001) and Staples et al. (2004) reject all reports from Hawaii as *S. wheeleri*.

** *S. cristatum* Hampe NWC: Miller et al. 1978, Whinam & Hope 2005. **NOTE:** The only report refers to *S. leratianum*, a taxon sometimes considered a synonym of *S. cristatum* (Wijk & Margadant 1967, Whinam 2003, Whinam & Hope 2005). See note under *S. leratianum*.

** *S. cuspidatum* subsp. *cuspidatum* PACIFIC: Séneca & Söderström 2009. NOTE: This was erroneously reported as the subspecies instead of the species.

** *S. perichaetiale* Hampe FIJ: **Eddy 1977** [incl. *S. vitjianum* as a synonym], Seppelt 2006. NWC: Pursell & Reese 1982, Thouvenot & Bardat 2010, NWC-SO: **Eddy 1977** [with *S. leratianum* as a questioned synonym], **Iwatsuki 1986**. **NOTE:** 1) Reports from Fiji are based on *S. vitjianum* being considerd synonymous with this taxon (Eddy 1977). 2) Reports from New Caledonia are based on *S. leratianum* being regarded as synonymous (Eddy 1977, Crum 1984). 3) Karlin & Andrus (1995), Karlin (2001) and Staples et al. (2004) reject all reports from Hawaii, considering them to be *S. palustre*. See also note under *S. vitjianum*. 4) *S. perichaetiale* must be rejected from the Pacific until the nomenclature and systematics of this group have been further investigated.

** *S. reichardtii* Hampe ex Warnst. FIJ: Paul 1924, Dixon & Greenwood 1930, Schultze-Motel 1973a, Whittier 1975, Miller et al. 1978, FIJ-VI: Whinam & Hope 2005. **NOTE:** Warnstorf (1890) included the report of *S. acutifolium* Ehrh. by Mitten (1873) in his new species *S. reichardtii* from St. Paul I., in the southern Indian Ocean. The specimen of "*S. acutifolium*" was collected by G. W. Milne (no. 22) on the expedition to the South Pacific with HMS Herald 1852-1861. The early collection number indicates that it was collected long before reaching the main destination and it is close to other Milne's collection numbers from St. Paul I., so the origin is almost certainly correct. In his *Flora Vitiensis* Mitten (1873) reported many taxa from places other than Fiji. Several later authors overlooked the locations given by Mitten and assumed them all to be from Fiji. All reports of *S. reichardtii* from South Pacific are based on this mistake. In addition, Whinam & Hope (2005) interpreted the word "Viti" in Warnstorf (1891) and Dixon & Greenwood (1930) as the island of Viti Levu while it is referring to the old name used for the whole Fijian Archipelago, thus erroneously giving it a too precise location.

Synonyms

Sphagnum antarcticum var. ≡ *lonchocladum* (Müll.Hal.) Warnst. = *S. palustre*

Sphagnum capillaceum var. *cuspidatum* (Ehrh. ex Hoffm.) Wahlenb. = *S. cuspidatum*

Sphagnum capillifolium var. *cuspidatum* (Ehrh. ex Hoffm.) Brid. = *S. cuspidatum*

Sphagnum cymbifolium (Ehrh.) Hedw. nom. inval. = *S. palustre*

Sphagnum henryense Warnst. = *S. palustre*

Sphagnum lonchocladum Müll.Hal. = *S. palustre*

Sphagnum palustre var. *cuspidatum* (Ehrh. ex Hoffm.) Lilj. = *S. cuspidatum*

Sphagnum rigidulum Warnst. = *S. wheeleri*

Sphagnum seemannii Müll.Hal. = *S. cuspidatum* subsp. *subrecurvum*

Sphagnum vulcanicum Warnst. = *S. wheeleri*

Sphagnum weberi Warnst. ≡ *S. seemannii* var. *weberi*

Sphagnum wheeleri var. *vulcanicum* (Warnst.) Warnst. = S. wheeleri

Acknowledgment

We are grateful to Anders Hagborg for useful comments on the manuscript.

References

Andrews AL (1951) Studies in the Warnstorf *Sphagnum* herbarium. VI. The subgenus *Inophloea* in the eastern hemisphere. *The Bryologist* 54: 83–91.

Bartram EB (1936) Contribution to the mosses of Fiji. *Occasional Papers of Bernice Pauahi Bishop Museum of Polynesian Ethnology and Natural History* XI (20): 1–30.

Bartram EB (1942) Mosses collected by the Hawaiian bog survey of 1938. *Occasional Papers of Bernice Pauahi Bishop Museum of Polynesian Ethnology and Natural History* XVI(14): 321–336.

Brotherus VF (1911) Contribution à la flore bryologique de la Nouvelle Calédonie. III. *Öfversigt af Finska Vetenskaps-Societetens Förhandlingar* 53A (11): 1–43.

Brummitt RK (2001) *World geographical scheme for recording plant distributions*. Ed. 2, (TDWG, Hunts Inst. Bot. Doc.: Pittsburgh)

Crum HA (1980) A guide to the identification of Mexican Sphagna. *Contributions from the university of Michigan herbarium* 14: 25–52.

Crum HA (1984) Sphagnopsida. Sphagnaceae. *North American Flora* 11: 1–180.

Crum HA (1986) Illustrated Moss Flora of Arctic North America and Greenland. 2. Sphagnaceae. *BioScience* 18: 1–61.

Degener O, Degener I, Hörmann H (1969) *Cynea carlsonii* and the unnatural distribution of *Sphagnum palustre* L. *Phytologia* 19: 1–3.

Dixon HN & Greenwood W (1930) The mosses of Fiji. *Proceedings of the Linnean Society of New South Wales* 55: 261–302.

Eddy A (1977) Sphagnales of Tropical Asia. *Bulletin of the British Museum (natural history), botany* 5: 359–445.

Fife AJ (1996) A synopsis of New Zealand *Sphagna*, with a description of *S. simplex* sp. nov. *New Zealand journal of botany* 34: 309–328.

Gangulee HC (1969) *Mosses of eastern India and adjacent regions. Fascicle 1 Sphagnideae, Andreaeideae & Nematodonteae.* (Calcutta).

Hill MO, Preston CD & Smith AJE (1992) *Atlas of the Bryophytes of Britain and Ireland. Volume 2 Mosses (except Diplolepideae).* (Harley Books: Colchester).

Hoe WJ (1978) Bryophyta Hawaiica Exsiccata — The first Century. *The Bryologist* 81: 411–415.
Iwatsuki Z (1986) A peculiar New Caledonian *Sphagnum* with rhizoids. *The Bryologist* 89: 20–22.
Karlin EF (2001) Taxonomy of Hawaiian *Sphagna*. *The Bryologist* 104: 290–296.
Karlin EF & Andrus RE (1995) The *Sphagna* of Hawaii. *The Bryologist* 98: 235–238.
Karlin EF, Giusti MM, Lake RA, Boles SB & Shaw AJ 2010 Microsatellite analysis of *Sphagnum centrale, S. henryense* and *S. palustre* (Sphagnaceae). *The Bryologist* 113: 90–98.
McQueen CB & Andrus RE (2006) Bryophyte Flora of North America.1. Introduction, Acrocarpous Mosses. *Flora of North America, Missouri Botanical Garden* 27: 1–65.
Miller HA, Whittier HO & Whittier BA (1978) Prodromus florae muscorum Polynesiae. *Bryophytorum Bibliotheca* 16: 1–334.
Mitten W (1861) Musci et Hepaticae Vitiensis. *Bonplandia* 9: 365–367.
Mitten W (1873) Musci, Jungermanniae and Marchantiae. Pp. 325-453 in Seemann B (ed.), *Flora vitiensis*. (Reeve: London).
Müller C (1874) Musci polynaesiae praesertim Vitiani et Samoani Graeffeani. *Journal of the Museum Godeffroy* 3(6): 51–90.
Müller C (1887) Sphagnorum novorum descriptio. *Flora* 70: 403–422.
Paul H (1924) Sphagnaceae (Torfmoose). Pp. 105-125 in Engler A (ed.), *Die natürlichen Pflanzenfamilien, vol. 10, heft 1*. (Wilhem Engelmann: Leipzig).
Pursell RA & Reese WD (1982) The mosses reported from New Caledonia. *Journal of the Hattori botanical laboratory* 53: 449–482.
Schabetsberger R, Drozdowski G, Rott E, Lenzenweger R, Jersabek CD, Fiers F, Traunspurger W, Reiff N, Stoch F, Kotov AA, Martens K, Schatz H & Kaiser R (2009) Losing the Bounty? Investigating Species Richness in Isolated Freshwater Ecosystems of Oceania. *Pacific Science* 63:153–179
Schultze-Motel W (1962) Beitrag zur Kenntniss der Laubmoose der Hawaii-Inseln. *Willdenowia*. 3: 97–107.
Schultze-Motel W (1973a) Katalog der Laubmoose von Melanesien. *Willdenowia* 7: 47–82.
Schultze-Motel W (1973b) Taxonomische Studien an samoanischen Laubmoosen. *Revue Bryologique et Lichénologique* 39: 245–252.
Séneca A & Söderström L (2009) Sphagnophyta of Europe and Macaronesia: a checklist with distribution data. *Journal of Bryology* 31: 243–254.
Seppelt R D (2006) Mosses. 1. Pp 89-107 in McCarthy PM (ed.), *Flora of Australia Vol. 51*. (Australian Biological Resources Study: Canberra).
Sharp AJ, Crum H & Eckel PM (1994) The moss flora of Mexico. *Memoirs of the New York botanical garden* 69: 1–1113.
Staples GW, Imada CT, Hoe WJ & Smith CW (2004) A revised checklist of Hawaiian mosses. *Tropical Bryology* 25: 35–70.
Thouvenot L & Bardat J (2010) Liste actualisée et annotée des mousses de Nouvelle-Calédonie. *Cryptogamie, Bryologie* 31: 163–197.
von Konrat M, Söderström L & Hagborg A (2010) The Early Land Plants Today project: A community-driven effort and a new partnership with Phytotaxa. *Phytotaxa* 9: 11–21.
von Konrat M, Naikatini A, Tuiwawa M, Söderström L, Fife A, Renner M, Brownsey P, Perrie L, Hagborg A, Pócs T, Lumbsch HT, Braggins J, Séneca A & Brown E (2011) A brief history of the cryptogams of Fiji and prospects for the future. *Telopea* 13: 361–374.
Waite M (2007) Mosses of Hawaii Volcanoes National Park. *University of Hawai'i at Mānoa, Technical Report* 153: 1–55.
Warnstorf C (1890) Beiträge zur Kenntniss exotischer Sphagna. *Hedwigia* 29: 213–258.
Warnstorf C (1891) Beiträge zur Kenntniss exotischer Sphagna. *Hedwigia* 30: 127-178.
Warnstorf C (1900) Weitere Beiträge zur Kenntniss der Torfmoose. *Botanisches Centralblatt* 21 (82): 7–14.
Warnstorf C (1901) Sphagnaceae (Torfmoose). Pp. 248–262 in Engler A (ed.), *Die natürlichen Pflanzenfamilien, I. Teil, Abt. 3* (Wilhem Engelmann: Leipzig).

Warnstorf C (1911) Sphagnales - Sphagnaceae (Sphagnologia Universalis). Pp. 1-546 in Engler A (ed.), *Das Pflanzenreich. Regni vegetabilis conspectus 51.* (Wilhem Engelman: Leipzig).

Whinam J, Hope GS, Clarkson BR, Buxton RP, Alspach PA & Adam P (2003) *Sphagnum* in peatlands of Australasia: Their distribution, utilisation and management. *Wetlands Ecology and Management* 11: 37–49.

Whinam J & Hope G (2005) *Sphagnum* peatlands of Australasia. *Denisia* 2: 1–38.

Whittier HO (1973) Mosses of the Marquesas Islands, French Polynesia. *The Bryologist* 76: 174-177

Whittier HO (1975) A preliminary list of Fijian mosses. *Florida Scientist* 38(2): 85–106.

Wijk R & Margadant W (1967) *Index Muscorum.4.* (Utrecht).

Manuscript received 10 January 2011, accepted 18 August 2011

Telopea13(3) 513–562

A revised checklist of Fijian ferns and lycophytes

P.J. Brownsey and L.R. Perrie

Museum of New Zealand Te Papa Tongarewa, P.O. Box 467, Wellington, New Zealand
Email: patb@tepapa.govt.nz

Abstract

A revised Checklist of 331 species of Fijian ferns and lycophytes is presented here. Six species are presumed to be introduced and 48 (15%) are endemic. The annotated list includes family, genus and species names for all Fijian ferns, and aligns them with names used by Brownlie (1977) in his *Pteridophyte Flora of Fiji*. Since publication of Brownlie's work, 29 species have been added to the Fijian fern flora, 79 of the previously recorded taxa now have different generic and/or species names, and c. 40% are placed in different families. Specimens of ferns in the South Pacific Regional Herbarium (SUVA) were examined, and all have been re-identified as far as possible using the updated names. The significance of this work in the context of the wider Pacific region is discussed.

Introduction

This Checklist of ferns and lycophytes for Fiji updates the names used by Brownlie (1977) in his *Pteridophyte Flora of Fiji*. There have been significant changes to the taxonomy of ferns since that time, particularly with re-circumscriptions of families and genera (Smith et al. 2006). Subsequent work focused on the fern flora of Fiji includes that of Kramer & Zogg (1988), Parris (1994), Ebihara & Iwatsuki (2007), and the National Museum of Nature and Science (2008). Since our initial unpublished report was submitted (Brownsey & Perrie 2008), Japanese pteridologists have published *Illustrated Flora of ferns and fern allies of South Pacific Islands* (National Museum of Nature and Science 2008). This book specifically covers the ferns of New Caledonia, Vanuatu, Fiji and Samoa, based on collections made by the South Pacific Fern Studies Group from 1993 to 2008. We have endeavoured to align our nomenclature with that used in their book, but have noted differences where these remain. New records for Fiji reported in their book are cited here. However, we have not had the opportunity to examine their collections which are mostly held in TNS.

There are several fern groups that require more extensive work to determine exactly what species are present in Fiji. There are a few species that probably ought to be deleted from the Flora but we cannot make such decisions without the opportunity to see cited specimens in other herbaria. There are also "species" which probably include more than one entity, and others where two or more species should be reduced to one.

© 2011 Royal Botanic Gardens and Domain Trust ISSN0312-9764

Such work is beyond the scope of the current project, but we have indicated where doubts remain.

Whilst this work is based specifically on Fiji, it does have a wider relevance for the whole of the Pacific region. Fiji is one of the larger island groups with a correspondingly large fern flora. Furthermore, it is situated midway between the Solomon Islands, whose ferns are an extension of the Malesian region, and the islands of French Polynesia in the eastern Pacific, which have a somewhat distinctive element. Providing updated names for Fijian ferns will therefore have significant benefit for many other island groups, particularly the neighbouring territories of Samoa, Tonga, Cook Islands, Niue, Vanuatu and New Caledonia. There is a considerable amount of overlap in the floristic composition of these islands. This Checklist of Fijian ferns, and particularly the annotations, will draw attention to further work that needs to be done.

Materials and Methods

We examined all the estimated 3000 sheets of Fijian ferns in the South Pacific Regional Herbarium (SUVA) at the University of the South Pacific, Suva, Fiji. Almost all sheets were assigned to folders that were annotated with the updated genus and species name. There was insufficient time for us to annotate every sheet, but sheets within each labelled folder can be appropriately re-labelled as the material is databased in future. A few sheets were considered to be unidentifiable and were labelled as such.

The only species that we did not have time to identify or sort were seven species of *Selaginella*. This is a particularly challenging group requiring identification with a compound microscope. We did not have the resources, time or detailed knowledge to identify the specimens of this group.

The names that we put on the folders are the currently accepted names in the attached Checklist. Some Fijian species are known only from collections in other herbaria (Brownlie 1977); specimens not represented at SUVA are indicated in the Checklist. Further information was extracted from several sources including the following:-

Papers published since 1977 that specifically identify new fern records for Fiji.

Revisions of genera and families published since 1977 that specifically include Fiji in their distributional information.

Recent Floras of neighbouring regions (e.g. Australia, New Zealand, Solomon Islands, New Caledonia, Vanuatu, Samoa, Hawai'i, etc.) that relate to Fiji.

Papers published since 1977, usually based on molecular analyses, which deal generally with the higher level classification of ferns.

We have followed Smith et al. (2006) for ferns and Christenhusz et al. (2011) for lycophytes in circumscribing families and genera, and in the arrangement of the families. Only where there is convincing contradictory evidence have we followed a different classification, and references are provided in every case. No attempt has been made to provide a classification above the level of family, although this is available from Smith et al. (2006) and Christenhusz et al. (2011).

Genera and species are arranged alphabetically within families for ease of use. Descriptions for most species are given in Brownlie (1977). However, where new

records have been accepted, reference is given to the publication establishing a Fijian presence, to any cited specimens and to a published description. Species presumed to be introduced to Fiji are identified.

In the Checklist itself we have retained Brownlie's names unless there is a good reason to change them. The list is annotated to indicate all such changes at family, genus and species level. References to modern revisions are provided. In addition, we have indicated instances where other authors have suggested possible synonymies and alternative names, or where there is uncertainty in the literature. It was beyond the scope of this project to undertake taxonomic revisions to confirm these suggestions, but the notes highlight genera and species that should be investigated if such work was to be carried out.

Three alphabetical appendices of names are provided to correlate the names used by Brownlie with our list:-

1. Names used by Brownlie linked to their currently accepted names.

2. New records for Fiji published since 1977.

3. Doubtful records and possible synonymies mentioned in the notes, linked to their currently accepted names.

Taxonomic treatment

A revised total of 331 species is listed here. Of these, four are either undescribed or of uncertain species identity. In making changes to Brownlie's nomenclature, we have adopted a conservative approach. Nevertheless, since 1977, 29 species have been newly recorded for Fiji, and 79 of the previously recorded taxa now have different generic or species names — about 33% of the currently recognised fern flora. In addition, about 40% of the species are now placed in different families compared to Brownlie's treatment.

Of the total of 331 species, 6 are presumed to be introduced and 48 are regarded as endemic to Fiji. The latter is just 15% of the total and compares with a figure of 46% for the New Zealand fern flora (Brownsey 2001). The research conducted by Japanese pteridologists in the South Pacific (National Museum of Nature and Science 2008) has greatly reduced the number of endemic species recognised by Brownlie (1977) but we suspect that future work in the region will reduce this proportion still further.

[E] Species endemic to Fiji

* Species considered to be introductions

^ Species not definitely represented in SUVA

Herbarium abbreviations follow Thiers (2011).

NMNS (2008) is used as an abbreviated reference for National Museum of Nature and Science (2008)

LYCOPODIACEAE

We follow the classification of Øllgard (1987) recognising *Huperzia*, *Lycopodium* and *Lycopodiella* in Fiji, rather than the single genus *Lycopodium* listed by Brownlie (1977).

HUPERZIA Bernh.

Huperzia carinata (Desv. ex Poir.) Trevis.

Huperzia foliosa (Copel.) Holub

E ***Huperzia magnifica*** (Brownlie) Holub

Glenny (unpub.) strongly advocates including the Fijian endemic *H. magnifica* under *H. dalhousieana* (Spring) Trevis. which is distributed through Malesia and the west Pacific. However, this requires confirmation, as Chinnock (1998a) indicates that *H. dalhousieana* extends no further east than New Guinea.

Huperzia melanesica (Brownlie) Holub

Huperzia nummulariifolia (Blume) Jermy

Huperzia parksii (Copel.) Holub

Huperzia phlegmaria (L.) Rothm.

^ ***Huperzia phlegmarioides*** (Gaud.) Rothm.

Recorded by NMNS (2008) but without citing a specimen. A description is given by Chinnock (1998a).

Huperzia phyllantha (Hook. et Arn.) Holub

Huperzia serrata (Thunb. ex Murray) Trevis.

Brownlie (1977) only records one specimen for Fiji, in BM (of which he saw a photograph), but there are now other specimens in SUVA. Not listed by NMNS (2008).

Huperzia squarrosa (G.Forst.) Trevis.

E ***Huperzia subtrifoliata*** (Brownlie) Holub

E ***Huperzia trifoliata*** (Copel.) Holub

^ ***Huperzia*** sp. 1

Recorded and illustrated as an undescribed species by NMNS (2008) (TNS 9520650).

LYCOPODIUM L.

Lycopodium clavatum L.

LYCOPODIELLA Holub

Lycopodiella cernua (L.) Pic.Serm.

SELAGINELLACEAE

We follow the treatment of *Selaginella* in Fiji by Gardner (1997). *Selaginella hordeiformis* Baker was recorded by NMNS (2008) without reference to a specimen, but this species was specifically excluded by Gardner.

SELAGINELLA P.Beauv.

E ***Selaginella breynioides*** Baker

Selaginella distans Warb.

Selaginella firmula A.Braun ex Kuhn

Selaginella laxa Spring

Gardner (1997) suggests that this species is only dubiously distinct from *S. ciliaris* (Retz) Spring, but nevertheless retains it for Fiji. Glenny (unpub.) reduces it to synonymy with *S. ciliaris*, whilst Jermy & Holmes (1998) indicate that *S. ciliaris*

extends into the west Pacific but make no mention of *S. laxa*. The relationship of these two species needs further investigation.

Selaginella rechingeri Hieron. ex Rech.

Selaginella victoriae T.Moore

E ***Selaginella viridangula*** Spring

OPHIOGLOSSACEAE

BOTRYCHIUM Sw.

^ ***Botrychium daucifolium*** Wall. ex Hook. et Grev.
Brownlie 907, cited by Brownlie (1977), is in CHR (340891!). NMNS (2008) state "*Botrychium daucifolium* is recorded from Fiji and Western Samoa. We could not find it from both islands". Consequently, they do not list it, but we retain it here on the basis of Brownlie's specimen in CHR.

OPHIOGLOSSUM L.

Ophioglossum pendulum L.

^ ***Ophioglossum petiolatum*** Hook.
O. petiolatum is often reduced to synonymy with *O. reticulatum*, but the two are retained here because of Brownlie's statement that they appear to be restricted to different ecological conditions in Fiji. *DA 14540* cited by Brownlie (1977), is in CHR (340890!).

Ophioglossum reticulatum L.

PSILOTACEAE

PSILOTUM Sw.

Psilotum complanatum Sw.

Psilotum nudum (L.) P.Beauv.

TMESIPTERIS Bernh.

Tmesipteris truncata (R.Br.) Desv.
NMNS (2008) also record *T. oblanceolata* Copel. but this is now regarded as a synonym of *T. truncata* (Chinnock 1998b).

EQUISETACEAE

EQUISETUM L.

Equisetum ramosissimum Desf. subsp. ***debile*** (Roxb.) Hauke
Hauke (1963) refers Fijian material of *E. ramosissimum* to subsp. *debile*. Brownlie (1977) misspelt the specific epithet as "*ramossisimum*".

MARATTIACEAE

ANGIOPTERIS Hoffm.

Angiopteris evecta (G.Forst.) Hoffm.
Var. *evecta* and var. *vaupelii* Hieron. are both recognised in Fiji by NMNS (2008) but without citing specimens. These varieties were not discussed by Brownlie (1977), and the key in NMNS (2008) suggests a lack of clear distinguishing characters. They require further investigation.

^ ***Angiopteris opaca*** Copel.
Brownlie (1977) stated that this species is known only from the Fijian type in MICH and differs from *A. evecta* by its degree of scaliness. However, NMNS (2008) indicate that they collected this species from Vanuatu and Samoa, as well as Fiji.

PTISANA Murdock

Ptisana smithii (Mett. ex Kuhn) Murdock
Treated by Brownlie (1977) in *Marattia*.

OSMUNDACEAE

LEPTOPTERIS C.Presl

Leptopteris wilkesiana (Brack.) H.Christ

HYMENOPHYLLACEAE

Brownlie (1977) recognised two large genera of filmy ferns — *Hymenophyllum* and *Trichomanes* - and we follow his classification. However, Ebihara et al. (2006) subdivided *Trichomanes* into eight separate genera, and their alternative names are given if this treatment is preferred.

HYMENOPHYLLUM J.Sm.

Hymenophyllum denticulatum Sw.

Hymenophyllum feejeense Brack.

Hymenophyllum flabellatum Labill.

Hymenophyllum holochilum (Bosch) C.Chr.
Brownlie (1977) treated this species as *H. affine* Brack. but Ebihara & Iwatsuki (2007) have shown that it is a synonym of *H. holochilum*.

Hymenophyllum imbricatum Blume

Hymenophyllum javanicum Spreng.
Brownlie (1977) recognised *H. samoense* Baker as also being in Fiji but this is synonymised with *H. javanicum* by NMNS (2008).

^ ***Hymenophyllum macgillivrayi*** (Baker) Copel.
Recorded by Ebihara & Iwatsuki (2007), based on the type specimen collected by Macgillivray from Fiji (K). A description is given by Copeland (1937).

^ ***Hymenophyllum multifidum*** (G.Forst.) Sw.
Recorded by Ebihara & Iwatsuki (2007) but without citing a specimen. A description is given by Copeland (1937).

^ ***Hymenophyllum pallidum*** (Blume) Ebihara et K.Iwats.
Recorded by NMNS (2008) but without citing a specimen. A description is given by Bostock & Spokes (1998a).

Hymenophyllum polyanthos (Sw.) Sw.

^ ***Hymenophyllum serrulatum*** (C.Presl) C.Chr.
Recorded by Ebihara & Iwatsuki (2007) but without citing a specimen. A description is given by Copeland (1937) as *H. meyenianum* (C.Presl) C.Chr.

^ ***Hymenophyllum tomaniiviense*** (Brownlie) Ebihara et K.Iwats.
Described as *Trichomanes* "*tomaiiviense*" by Brownlie (1977) but this is a spelling

error (Ebihara et al. 2006). The species is treated in *Hymenophyllum* by Ebihara et al. (2006). Only one possible, unlocalised specimen was seen in SUVA. The holotype, *Brownlie 1776*, is in CHR (340646!).

TRICHOMANES L.

Trichomanes aphlebioides H.Christ
syn. *Crepidomanes aphlebioides* (H.Christ) I.M.Turner

Trichomanes apiifolium C.Presl
syn. *Callistopteris apiifolia* (C.Presl) Copel.

Trichomanes asae-grayi Bosch
syn. *Abrodictyum asae-grayi* (Bosch) Ebihara et K.Iwats.

Trichomanes atrovirens (C.Presl) Kunze (Fig. 1a)
syn. *Cephalomanes atrovirens* C.Presl
Brownlie (1977) treated this species as *Trichomanes boryanum* Kunze, but NMNS (2008) synonymised it with *T. atrovirens* (as *Cephalomanes atrovirens* C.Presl).

Trichomanes bimarginatum Bosch
syn. *Didymoglossum bimarginatum* (Bosch) Ebihara et K.Iwats.

Trichomanes bipunctatum Poir.
syn. *Crepidomanes bipunctatum* (Poir.) Copel.

E ***Trichomanes caespifrons*** C.Chr.
Needs a new combination if treated as *Abrodictyum*.
Not recognised by NMNS (2008).

Trichomanes caudatum Brack.
syn. *Abrodictyum caudatum* (Brack.) Ebihara et K.Iwats.

Trichomanes dentatum Bosch
syn. *Abrodictyum dentatum* (Bosch) Ebihara et K.Iwats.
Glenny (unpub.) treats *Trichomanes dentatum* and *T. obscurum* Blume as one variable species under *T. obscurum*, but Murdock & Smith (2003) recognise *T. dentatum*. This requires further investigation.

Trichomanes endlicherianum C.Presl
syn. *Polyphlebium endlicherianum* (C.Presl) Ebihara et K.Iwats.

Trichomanes humile G.Forst.
syn. *Crepidomanes humile* (G.Forst.) Bosch

Trichomanes intermedium Bosch
syn. *Crepidomanes intermedium* (Bosch) Ebihara et. K.Iwats.

Trichomanes maximum Blume
syn. *Vandenboschia maxima* (Blume) Copel.

Trichomanes minutum Blume
syn. *Crepidomanes minutum* (Blume) K.Iwats.
Brownlie (1977) recognised *Trichomanes saxifragoides* C.Presl but this is included within one polymorphic species, *T. minutum* (syn. *Crepidomanes minutum*), by Yoroi & Iwatsuki (1977), Ebihara et al. (2006) and NMNS (2008).

^ ***Trichomanes motleyi*** Bosch
syn. *Didymoglossum motleyi* (Bosch) Ebihara et K.Iwats.
Brownlie (1977) treated this species as *Trichomanes cultratum* Baker, but this was synonymised with *T. motleyi* (as *Didymoglossum motleyi*) by NMNS (2008).

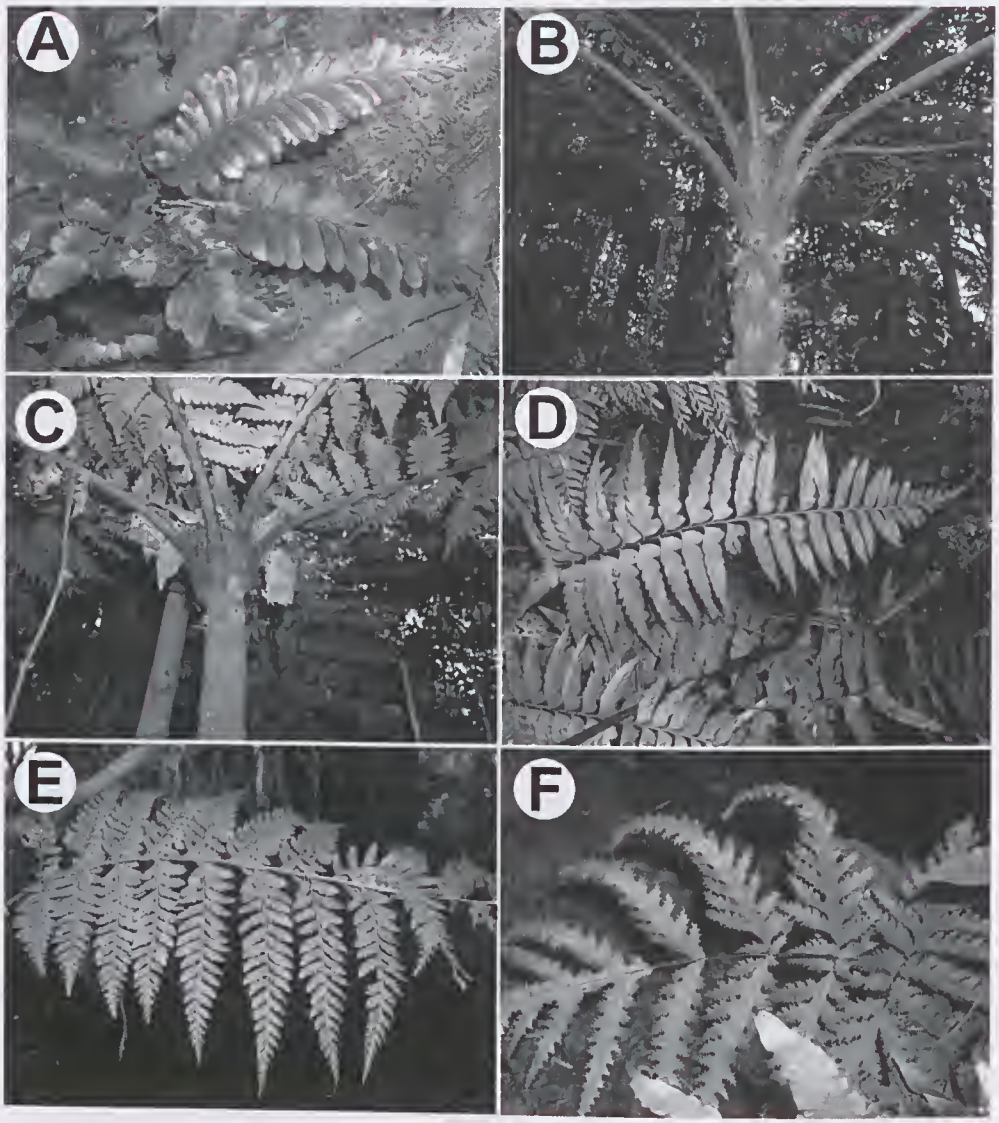

Fig. 1. Ferns of Fiji. **a**, *Trichomanes atrovirens* (WELT P022770). Treated as *Trichomanes boryanum* by Brownlie (1977) and as *Cephalomanes atrovirens* by NMNS (2008); **b**, the Fijian endemic *Cyathea microlepidota*, whose longer stipes distinguish it from the otherwise similar *C. propinqua*; **c**, the Fijian endemic *Cyathea propinqua*; **d**, *Asplenium lobulatum* (WELT P022796). Recorded for Fiji by Parris (1994), having been previously misidentified as *A. polyodon*, *A. insiticium*, or as hybrids between the two by Brownlie (1977); **e**, *Polystichum* aff. *moluccense* (WELT P022791), following Parris (1994). Listed as *P. aculeatum* by Brownlie (1977); **f**, the Fijian endemic *Tectaria godeffroyi* (WELT P022774), with its distinctive marginal sori.

Trichomanes tahitense Nadeaud
syn. *Didymoglossum tahitense* (Nadeaud) Ebihara et K.Iwats

^***Trichomanes vitiense*** Baker
syn. *Crepidomanes vitiense* (Baker) Bostock.
Known from Fiji only by the type in K.

GLEICHENIACEAE

Brownlie (1977) recognised only two genera of umbrella ferns in Fiji — *Gleichenia* and *Dicranopteris* — but, following Smith et al. (2006), we recognise *Diplopterygium* and *Sticherus* in place of *Gleichenia sens. lat.*

DICRANOPTERIS Bernh.

E ***Dicranopteris caudata*** (Copel.) H.St.John

^ ***Dicranopteris curranii*** Copel.
Collected and recorded by NMNS (2008) (TNS 9521360). A description is given by Holttum (1959).

Dicranopteris linearis (Burm.f.) Underw.
It is unclear which variety of this species Fijian material should be referred to.

DIPLOPTERYGIUM (Diels) Nakai

Diplopterygium longissimum (Blume) Nakai
Included by Brownlie in *Gleichenia sens. lat.*

STICHERUS C.Presl

Sticherus oceanicus (Kuhn) H.St.John
Included by Brownlie in *Gleichenia sens. lat.*

DIPTERIDACEAE

Dipteris was included in the Polypodiaceae by Brownlie (1977) but is now generally included in its own family (Smith et al. 2006).

DIPTERIS Reinw.

Dipteris conjugata Reinw.

LYGODIACEAE

Brownlie (1977) included *Lygodium* within Schizaeaceae, but Lygodiaceae is recognised as a separate family by Smith et al. (2006).

LYGODIUM Sw.

^ ***Lygodium microphyllum*** (Cav.) R.Br.
Recorded and collected by NMNS (2008) but without citing a specimen. A description is given by Chinnock (1998c).

Lygodium reticulatum Schkuhr

SCHIZAEACEAE

SCHIZAEA Sm.

Schizaea dichotoma (L.) Sm.

^ ***Schizaea fistulosa*** Labill.
Only one sterile specimen (*Wilson 7*), cited by Brownlie (1977), was seen in SUVA.

Schizaea melanesica Selling

SALVINIACEAE

SALVINIA Ség.

* ***Salvinia molesta*** D.S.Mitch.

Recorded as *S. auriculata* Aubl. by Brownlie (1977) but almost certainly the Fijian plant is referable to the rampant tropical Kariba weed (Mitchell 1972). All specimens in SUVA are sterile and cannot be identified with certainty.

CYATHEACEAE

Smith et al. (2006) recognise four genera amongst those species included within *Cyathea* by Brownlie (1977), but we recognise them at the subgeneric level following Large & Braggins (2004). Alternative names in *Alsophila*, *Gymnosphaera* and *Sphaeropteris* are provided where they exist.

CYATHEA Sm.

Cyathea affinis (G.Forst.) Sw.

syn. *Alsophila tahitensis* Brack. (non *A. affinis* Fée)

Cyathea alta Copel.

syn. *Alsophila alta* (Copel.) R.M.Tryon

Confused with the unrelated *C. alata* (E.Fourn.) Copel. from New Caledonia by NMNS (2008).

Cyathea decurrens (Hook.) Copel.

Cyathea horuei (Baker) Copel.

syn. *Gymnosphaera hornei* (Baker) Copel.

Cyathea lunulata (G.Forst.) Copel. subsp. ***vitiensis*** (Carruth.) Holttum

syn. *Sphaeropteris lunulata* (G.Forst.) R.M.Tryon

NMNS (2008) also record *Cyathea lunulata* subsp. *lunulata* without citing a specimen. However, the infraspecific treatment of *C. lunulata* needs further investigation before accepting both subspecies in Fiji. The combination for subsp. *vitiensis* in *Sphaeropteris* has not been made.

Cyathea medullaris (G.Forst.) Sw.

syn. *Sphaeropteris medullaris* (G.Forst). Bernh.

Whether Fijian material is the same as the New Zealand species requires further investigation.

[E] ***Cyathea microlepidota*** Copel. (Fig. 1b)

syn. *Sphaeropteris microlepidota* (Copel.) R.M.Tryon

Not listed by NMNS (2008). Based on specimens in SUVA and our own field observations, *Cyathea microlepidota* (Fig. 1b) and *C. propinqua* (Fig. 1c) are clearly distinct from one another and other tree ferns in Fiji.

[E] ^***Cyathea plagiostegia*** Copel.

syn. *Alsophila plagiostegia* (Copel.) R.M.Tryon

Known only from the type in BISH and one barely fertile specimen in SUVA. Distinguished from *C. affinis* only by size and a darker indusium. Requires further investigation.

[E] ***Cyathea propinqua*** Mett. (Fig. 1c)

syn. *Sphaeropteris propinqua* (Mett.) R.M.Tryon

Not listed by NMNS (2008). Based on specimens in SUVA and our own field

observations, *Cyathea microlepidota* (Fig. 1b) and *C. propinqua* (Fig. 1c) are clearly distinct from one another and other tree ferns in Fiji.

^ ***Cyathea subsessilis*** Copel.
syn. *Sphaeropteris subsessilis* (Copel.) R.M.Tryon
Collected once in Fiji and differs from *C. propinqua* only in size and scale type. Not listed by NMNS (2008), and requires further investigation.

Cyathea truncata (Brack.) Copel.
syn. *Sphaeropteris truncata* (Brack.) R.M.Tryon

DICKSONIACEAE

Brownlie (1977) included all the tree fern genera in Cyatheaceae, but following Smith et al. (2006) we recognise Dicksoniaceae as a separate family from Cyatheaceae.

CALOCHLAENA (Maxon) M.D.Turner et R.A.White

Maxon (1922) described *Culcita blepharodes* from material collected in Fiji by the Wilkes Expedition. White & Turner (1988) regarded it as a synonym of the Australian endemic *Calochlaena dubia* (R.Br.) M.D.Turner et R.A.White, being either incorrectly attributed to Fiji or an introduction from Australia. No other Fijian specimens are known, and Brownlie (1977) did not mention Maxon's species. Its presence in Fiji requires confirmation.

Calochlaena straminea (Labill.) M.D.Turner et R.A.White
This species was included in *Culcita* by Brownlie (1977), but White & Turner (1988) transferred it to the new genus *Calochlaena*.

DICKSONIA L'Hér.

Dicksonia brackenridgei Mett.

LINDSAEACEAE

LINDSAEA Dryand. ex Sm.

Lindsaea agatii (Brack.) Lehtonen et Tuomisto
Recognised by Brownlie (1977) as a subspecies of *L. ensifolia* but raised to species rank by Lehtonen et al. (2010).

Lindsaea gueriniana (Gaudich.) Desv.
Not listed by Kramer (1970) for Fiji but recorded by Brownlie (1977) "for the first time … in a very restricted area … near the summit of Mt Korobaba" supported by two specimens. Not listed by NMNS (2008).

Lindsaea harveyi Carruth. ex Seem.

Lindsaea lapeyrousei (Hook.) Baker
Listed as *Lindsaea lapeyrousii* subsp. *fijiensis* K.U.Kramer by Brownlie (1977), but Lehtonen et al. (2010) corrected the spelling to *L. lapeyrousei* and rejected the subspecies. The species was not listed by NMNS (2008), but is accepted here following Lehtonen et al. (2010).

Lindsaea moorei (Hook.) E.Fourn.

Lindsaea obtusa J.Sm. ex Hook.
Brownlie (1977) states that this species has been collected only once in Fiji, and is otherwise distributed from Taiwan and Micronesia to Queensland. Kramer

(1970) notes that it is largely replaced in the Pacific by *L. harveyi*. Glenny (unpub.) suggests that there is only one variable species. The presence of *L. obtusa* in Fiji therefore needs confirmation. There are two possible collections in SUVA. Not listed by NMNS (2008).

Lindsaea pacifica K.U.Kramer

Lindsaea pickeringii (Brack.) Mett. ex Kuhn

^ ***Lindsaea propinqua*** Hook. in Night.
Very dubiously recorded for Fiji by Kramer (1970) on the basis of two poorly localised 19th century collections in US. Accepted by Brownlie (1977) but not listed by NMNS (2008).

Lindsaea pulchra (Brack.) Carruth. ex Seem. var. ***pulchra***

E ***Lindsaea pulchra*** (Brack.) Carruth. ex Seem. var. ***protracta*** (Copel.) Brownlie

^ ***Lindsaea repens*** (Bory) Thwaites var. ***marquesensis*** E.D.Br.
Brownlie (1977) recognised, but did not list, any specimens of var. *marquesensis*; however, Kramer (1970) cites seven Fijian collections.

Lindsaea repens (Bory) Thwaites var. ***sessilis*** (Copel.) K.U.Kramer
Based on DNA sequence analysis, Lehtonen et al. (2010) raised *L. repens* var. *sessilis* to species rank as *L. sessilis* Copel., and suggested that many of the other varieties of *L. repens* might warrant the same status. However, they did not analyse var. *marquesensis* and its correct rank remains uncertain. Both Fijian taxa are therefore retained here as varieties of *L. repens* until a full analysis is completed.

Lindsaea rigida J.Sm.

Lindsaea tetragona K.U.Kramer

E ***Lindsaea vitiensis*** K.U.Kramer

ODONTOSORIA Fée

Odontosoria chinensis (L.) J.Sm.
Treated in *Sphenomeris* by Brownlie (1977), but referred to *Odontosoria* by Lehtonen et al. (2010).

TAPEINIDIUM (C.Presl) C.Chr.

Tapeinidium denhamii (Hook.) C.Chr.

Tapeinidium melanesicum K.U.Kramer

SACCOLOMATACEAE

Brownlie (1977) regarded these species as belonging to *Orthiopteris* in the Dennstaedtiaceae. We follow Smith et al. (2006) in treating them as *Saccoloma* in the Saccolomataceae.

SACCOLOMA Kaulf.

E ***Saccoloma ferulaceum*** (T.Moore) R.M.Tryon et A.F.Tryon

Saccoloma tenue (Brack.) Mett.

DENNSTAEDTIACEAE

Brownlie (1977) recognised Dennstaedtiaceae and Hypolepidaceae but, following Smith et al. (2006), we include them both within the Dennstaedtiaceae. Schuettpelz & Pryer (2007) found *Dennstaedtia* to be strongly polyphyletic, suggesting that the generic classification of this group needs further investigation.

DENNSTAEDTIA Bernh.

Dennstaedtia flaccida (G.Forst.) Bernh.

Dennstaedtia glabrata (Ces.) C.Chr.

[E] ***Dennstaedtia inermis*** (Baker) Brownlie

HISTIOPTERIS (Thunb.) J.Sm.

Histiopteris incisa (Thunb.) J.Sm.

[E] ***Histiopteris sinuata*** (Brack.) J.Sm.

Glenny (unpub.) suggests *H. stipulacea* (Hook.) Copel. (Malesia), *H. sinuata* (Fiji), *H. integrifolia* Copel. (Manus Island) and *H. herbacea* Copel. (Solomon Islands) could all be regarded as a single species, and this requires further investigation. Note that while the stipules in *H. sinuata* are greatly reduced, they are *not* absent as stated by Brownlie (1977).

HYPOLEPIS Bernh.

Hypolepis elegans Carruth.

^ ***Hypolepis tenuifolia*** (G.Forst.) Bernh. ex C.Presl

Brownlie (1977) described this species as *H. nausoriensis*. NMNS (2008) followed his treatment, but the name was reduced to synonymy under *H. tenuifolia* by Brownsey (1987). The type of *H. nausoriensis* is in CHR!

MICROLEPIA C.Presl

Microlepia speluncae (L.) T.Moore

^ ***Microlepia strigosa*** (Thunb.) C.Presl

Known from a single collection in UC from near Nadarivatu.

[E] ***Microlepia vitiensis*** Brownlie

PTERIDIUM Gled. ex Scop.

Pteridium esculentum (G.Forst.) Cockayne

PTERIDACEAE

We follow Smith et al. (2006) in recognising the large family Pteridaceae, in contrast to Brownlie (1977) who assigned this group to Vittariaceae and Adiantaceae. *Stenochlaena*, included here by Brownlie, is now recognised in Blechnaceae.

ACROSTICHUM L.

Acrostichum aureum L.

Acrostichum speciosum Willd.

Recorded by Parris (1994), and accepted here, but not listed by NMNS (2008). A description is given by Kramer & McCarthy (1998).

ADIANTUM L.

* ***Adiantum capillus-veneris*** L.

Recorded by NMNS (2008) without citing a specimen. The identity of this species needs confirmation (cf. *A. tenerum* Sw.) but it appears to be well established in Suva. There is also a specimen in SUVA from "Naitasiri, forest behind Sawani village, *Brownlie 774*". A description of *A. capillus-veneris* is given by Bostock (1998a).

Adiantum diaphanum Blume

Adiantum hispidulum Sw.

[E] ***Adiantum hornei*** Baker

Adiantum philippense L.

Treated as *A. lunulatum* Burm.f. by Glenny (unpub.).

* ***Adiantum trapeziforme*** L.

This species appears to be well established in several places in the south of Viti Levu. There are also two specimens in SUVA from "Ba, Mt Natobilibili, hill slope 1900 ft, *D. Koroiveibau*, 10.4.1965 (14198)" and "Viti Levu, Nadroga, Nagalemarie, *S. Vodonaivalu 1614*, 8.8.1989". It was recorded by NMNS (2008) without citing a specimen. A description is given by Mickel & Smith (2004).

ANTROPHYUM Kaulf.

Antrophyum alatum Brack.

Glenny (unpub.) includes this species under *A. callifolium* Blume, but Pichi-Sermolli (1991) and Jones (1998c) treat them as separate species, and *A. alatum* is retained here.

Antrophyum plantagineum (Cav.) Kaulf.

Antrophyum semicostatum Blume

^ ***Antrophyum smithii*** C.Chr. in A.C.Sm.

Known only from specimens in BISH and US according to Brownlie (1977), but collected and recorded by NMNS (2008).

Antrophyum subfalcatum Brack.

CERATOPTERIS Brongn.

* ***Ceratopteris thalictroides*** (L.) Brongn.

CHEILANTHES Sw.

^ ***Cheilanthes farinosa*** (Forssk.) Kaulf.

Brownlie (1977) recorded this species for Fiji on the basis of a "somewhat doubtful identification" of a single collection in K from west-central Viti Levu. This specimen needs checking to determine if it should be identified as *Pityrogramma calomelanos*, now recognised as adventive in Fiji (see below).

Cheilanthes nudiuscula (R.Br.) T.Moore

Listed as *C. hirsuta* (Poir.) Mett. by Brownlie (1977) but reduced to synonymy under *C. nudiuscula* by Chambers & Farrant (1998).

Cheilanthes tenuifolia (Burm.f.) Sw.

CONIOGRAMME Fée

Coniogramme fraxinea (D.Don) Diels

DORYOPTERIS J.Sm.

Doryopteris concolor (Langsd. et Fisch.) Kuhn

MONOGRAMMA Schkuhr

Monogramma paradoxa (Fée) Bedd.
Recognised by Brownlie (1977) and NMNS (2008) as *Vaginularia angustissima* but included in the synonymy of *Monogramma paradoxa* by Christensen (1906). *Vaginularia* is reduced to synonymy with *Monogramma* by Smith et al. (2006).

PITYROGRAMMA Link

^* ***Pityrogramma calomelanos*** (L.) Link
This species was seen by us in southern Viti Levu, and was collected and recorded by NMNS (2008) (TNS 9528567). Note comments under *Cheilanthes farinosa* (above). A description of *Pityrogramma calomelanos* is given by Bostock (1998a).

PTERIS L.

Pteris comans G.Forst.

Pteris ensiformis Burm.f.

Pteris excelsa Gaudich.

Pteris litoralis Rech.

Pteris mertensioides Willd.

^ ***Pteris milneana*** (Hook.) Baker
Included within *P. tripartita* by Brownlie (1977), but recorded separately by Parris (1994) and accepted here. A diagnosis is given by Copeland (1929).

^ ***Pteris multifida*** Poir.
Collected and recorded by NMNS (2008) (TNS 9509957). A description is given by Li et al. (1975).

Pteris pacifica Hieron.

E ***Pteris parhamii*** Brownlie
Described as a new endemic species by Brownlie (1977), but included within *P. werneri* (Rosenst.) Holttum by Glenny (unpub.). Brownlie's name is retained here, but needs further investigation.

^ ***Pteris tremula*** R.Br.
Known only from a single collection in BISH from Kadavu according to Brownlie (1977), but also recorded by NMNS (2008) without citing a specimen.

Pteris tripartita Sw.

E ***Pteris vitiensis*** Baker

Pteris vittata L.

SYNGRAMMA J.Sm.

Syngramma borneensis (Hook.) J.Sm.

E ***Syngramma spathulata*** (C.Chr.) Holttum

TAENITIS Willd. ex Schkuhr
Taenitis blechnoides (Willd.) Sw. is listed for Fiji by Holttum (1968), Kato (1988), Bostock (1998a) and Glenny (unpub.) but specifically excluded by Brownlie (1977, p. 6). No specimens are cited by these authors, and none were seen in SUVA. Its presence in Fiji therefore needs confirmation.

Taenitis hookeri (C.Chr.) Holttum

Taenitis pinnata (J.Sm.) Holttum var. ***pinnata***

Taenitis pinnata (J.Sm.) Holttum var. ***brachysora*** (Baker) Holttum

E ***Taenitis pinnata*** (J.Sm.) Holttum var. ***polypodioides*** (Baker) Holttum

VITTARIA Sm.

Vittaria elongata Sw.

Vittaria scolopendrina (Bory) Thwaites

ASPLENIACEAE

Brownlie (1977) recognised both *Asplenium* and *Loxoscaphe* in Fiji, but we follow Smith et al. (2006) in reducing *Loxoscaphe* to synonymy under *Asplenium*, and accepting *Hymenasplenium* as a segregate genus.

ASPLENIUM L.

Asplenium amboinense Willd.

Asplenium australasicum Hook.

Asplenium bipinnatifidum Baker

Asplenium carruthersii Baker

Noted by Glenny (unpub.) as similar to *A. oligolepidum* C.Chr. of New Caledonia.

Asplenium caudatum G.Forst.

Asplenium cuneatum Lam.

Asplenium gibberosum (G.Forst.) Mett.

Treated by Brownlie (1977) in *Loxoscaphe*, but now generally included in *Asplenium*.

E ***Asplenium induratum*** Hook.

Asplenium insiticium Brack.

Asplenium laserpitiifolium Lam.

Glenny (unpub.) suggests that the relationship of this species to *A. neolaserpitiifolium* Tardieu et Ching and *A. pseudolaserpitiifolium* Tardieu et Ching requires further investigation.

Asplenium lobulatum Mett. ex Kuhn (Fig. 1d)

Recorded by Parris (1994). Several specimens in SUVA belong to this species, but were previously misidentified as *A. polyodon*, *A. insiticium*, or as hybrids between the two (as discussed by Brownlie 1977, p. 217). A description is given by Christensen (1943).

Asplenium marattioides (Brack.) C.Chr.

Asplenium nidus L.

Asplenium polyodon G.Forst.

E ***Asplenium stenolobum*** C.Chr.

Treated as *Loxoscaphe foeniculaceum* (Hook.) T.Moore by Brownlie, but now generally included in *Asplenium*. Christensen (1906) proposed *A. stenolobum* as a *nomen novum* for this species because of an earlier homonym. Should be compared with Samoan material, especially *A. powellii* Baker.

Asplenium tenerum G.Forst.

HYMENASPLENIUM Hayata

Hymenasplenium excisum (C.Presl) S.Linds.

Treated as *Asplenium excisum* C.Presl by Brownlie (1977) but now included in *Hymenasplenium*.

Hymenasplenium unilaterale (Lam.) Hayata
Treated as *Asplenium unilaterale* Lam. by Brownlie (1977) but now included in *Hymenasplenium.*

THELYPTERIDACEAE

Following Holttum (1971), Brownlie (1977) recognised nine genera of Thelypteridaceae in Fiji. His classification is accepted here, with the addition of *Chingia* and *Pseudophegopteris* recorded by Parris (1994).

CHINGIA Holttum

^ ***Chingia*** sp. 1 aff. ***imponens*** (Ces.) Holttum
Collected, recorded and illustrated by NMNS (2008) (TNS 9527705, 9527706, 9523655).

^ ***Chingia longissima*** (Brack.) Holttum
Recorded by Parris (1994). A description is given by Holttum (1977).

CHRISTELLA H.Lév.

Christella arida (D.Don) Holttum

Christella dentata (Forssk.) Brownsey et Jermy

Christella harveyi (Mett.) Holttum

Christella pacifica Holttum

Christella parasitica (L.) H.Lév.

Christella subpubescens (Blume) Holttum

CORYPHOPTERIS Holttum

Coryphopteris seemannii Holttum

E ^ ***Coryphopteris vitiensis*** Holttum
Specimens cited by Brownlie (1977), including *Brownlie 900, 1777* (isotype, CHR 339288) and *DA 18769A*, are in CHR!

CYCLOSORUS Link

Cyclosorus interruptus (Willd.) H.Itô
Listed as *C. tottus* (Thunb.) Pic.Serm. by Brownlie (1977), but treated as *C. interruptus* by Holttum (1977).

MACROTHELYPTERIS (H.Itô) Ching

Macrothelypteris polypodioides (Hook.) Holttum

Macrothelypteris torresiana (Gaudich.) Ching

PLESIONEURON (Holttum) Holttum

NMNS (2008) indicated that there was a previous record of *Plesioneuron attenuatum* (Brack.) Holttum from Fiji, but did not collect a specimen themselves or cite an earlier reference. Holttum (1975) regarded this species as distributed from "Bismarck Archipelago to Tahiti", but did not cite any Fijian specimens. Brownlie did not record the species in Fiji and hence its occurrence there is unsubstantiated.

E ***Plesioneuron archboldiae*** (Copel.) Holttum

Plesioneuron hopeanum (Baker) Holttum

Plesioneuron prenticei (Carruth.) Holttum

PNEUMATOPTERIS Nakai

Pneumatopteris costata (Brack.) Holttum

Pneumatopteris magnifica (Copel.) Holttum
P. transversaria (Brack.) Holttum is listed for Fiji by Holttum (1977) but Fijian material is reduced to synonymy with *P. magnifica* by Brownlie (1977).

[E] ***Pneumatopteris parksii*** (F.Ballard) Holttum

PRONEPHRIUM C.Presl

Glenny (unpub.) and Bostock (1998b) list *P. asperum* (C.Presl) Holttum for Fiji but without any cited specimens. However, it is not listed by Brownlie (1977) or by Holttum (1977) for the Pacific, and its presence in Fiji remains unsubstantiated.

Pronephrium beccarianum (Ces.) Holttum

Pronephrium rubrinerve (Mett.) Holttum

Pronephrium triphyllum (Sw.) Holttum

PSEUDOPHEGOPTERIS Ching

[^] ***Pseudophegopteris paludosa*** (Blume) Ching
Described as *P. fijiensis* Kramer et Zogg (1988) (holotype Z, isotype K) but reduced to synonymy with *P. paludosa* by Parris (1994). Its relationship to *P. persimilis* (Baker) Holttum from Samoa needs further study. Only one possible specimen seen in SUVA.

SPHAEROSTEPHANOS J.Sm.

Sphaerostephanos decadens (Baker) Holttum
Listed as *Cyclosorus decadens* by Brownlie (1977).

Sphaerostephanos heterocarpus (Blume) Holttum
Listed as *Cyclosorus suprastrigosus* (Rosenst.) Copel. by Brownlie (1977), but treated as *S. heterocarpus* and later reduced to synonymy by Holttum (1977, 1981).

Sphaerostephanos invisus (G.Forst.) Holttum

Sphaerostephanos unitus (L.) Holttum

WOODSIACEAE

This group was previously included in Athyriaceae by Brownlie (1977), but is treated in the Woodsiaceae by Smith et al. (2006).

DEPARIA Hook. et Grev.

Deparia boryana (Willd.) M.Kato
Treated in *Lunathyrium* by Brownlie (1977) but transferred to *Deparia* by Kato (1984).

[E] ***Deparia gordonii*** (Baker) M.Kato
Treated in *Lunathyrium* by Brownlie (1977) but transferred to *Deparia* by Kato (1984).

[^] ***Deparia japonica*** (Thunb.) M.Kato
Collected, recorded and illustrated by NMNS (2008) (TNS 9523481), in addition to *D. petersenii*. Descriptions distinguishing the two are given by Kato (1984).

Deparia petersenii (Kunze) M.Kato

Treated as *Lunathyrium japonicum* (Thunb.) Sa.Kurata by Brownlie (1977) but Fijian material was placed in *Deparia petersenii* by Kato (1984).

DIPLAZIOPSIS C.Chr.

Diplaziopsis javanica (Blume) C.Chr.

DIPLAZIUM Sw.

Diplazium bulbiferum Brack.

Glenny (unpub.) also lists *D. dameriae* Pic.Serm. for Fiji, but cites no specimen. Pichi Sermolli (1991) confirms the two species are different, but lists only *D. bulbiferum* from Fiji. All material in SUVA is similar to *D. bulbiferum* with eroded basiscopic pinnules, and no sign of auricles as in *D. dameriae*.

Diplazium dietrichianum (Luerss.) C.Chr.

Treated as *Diplazium esculentum* (Retz.) Sw. by Brownlie. *Diplazium dietrichianum* is listed for Fiji by Jones (1998a), separating it from *D. esculentum sens. str.* by the vein pattern, but no specimen is cited. All Fijian specimens in SUVA and CHR have the vein pattern of *D. dietrichianum*. *Diplazium esculentum* may also be present in Fiji, but this needs confirmation. Some CHR specimens labelled by Brownlie as *D. esculentum* approach *D. dilatatum*.

Diplazium dilatatum Blume

Diplazium echinatum C.Chr.

E ^ ***Diplazium gillespiei*** (Copel.) M.Kato

Treated as *Lunathyrium gillespiei* by Brownlie (1977) but transferred to *Diplazium* by Kato (1984). Recorded by Brownlie from a single collection in US from Namosi, but also collected and recorded by NMNS (2008) (TNS 9522685).

Diplazium harpeodes T.Moore

Diplazium melanocaulon Brack. var. ***melanocaulon***

Diplazium melanocaulon Brack. var. ***coriaceum*** (Carruth. ex Seem.) Brownlie

Diplazium proliferum (Lam.) Kaulf.

Brownlie (1977) attributes the authority for this combination to du Petit-Thouars but, as explained by Ballard (1955), the combination was not validly made, and the correct citation is *Diplazium proliferum* (Lam.) Kaulf., Enum. Filic. 182 (1824).

BLECHNACEAE

BLECHNUM L.

Blechnum chambersii Tindale

Treated as *B. doodioides* (Brack.) Brownlie by Brownlie (1977), but this is a later homonym of *B. doodioides* Hook. Parris (1980) reinstated the name *B. chambersii*. The relationship of this species to *B. norfolkianum* (Heward) C.Chr. needs further investigation.

E ***Blechnum difforme*** Copel.

^* ***Blechnum gibbum*** (Labill.) Mett.

Recorded only once from an unlocalised specimen in BISH. Considered by Brownlie (1977) to be possibly naturalised.

Blechnum melanocaulon (Brack.) T.C.Chambers et P.A.Farrant
Treated as *B. coriaceum* (Brack.) Brownlie by Brownlie (1977) and NMNS (2008) but reduced to synonymy with *B. melanocaulon* by Chambers & Farrant (2001).

Blechnum milnei (Carruth.) C.Chr.

Blechnum orientale L.

Blechnum pilosum (Brack.) Brownlie
Brownlie (1977) suggests this may be a race of *B. vulcanicum* (Blume) Kuhn, but Chambers & Farrant (2001) note that some forms of *B. vulcanicum* outside Malesia warrant separate taxonomic status. Fijian material needs further investigation.

E ***Blechnum vittatum*** Brack.

DOODIA R.Br.

Molecular evidence suggests that *Doodia* is nested within *Blechnum* (Shepherd et al. 2007), and that a new generic classification is required within Blechnaceae.

Doodia brackenridgei Carruth. ex Seem.

^ ***Doodia media*** R.Br.
Recorded by NMNS (2008) but without citing a specimen. A description is given by Parris (1998).

STENOCHLAENA J.Sm.
Included by Brownlie (1977) in Adiantaceae, but now treated in the Blechnaceae (Smith et al. 2006).

Stenochlaena palustris (Burm.f.) Bedd.

HYPODEMATIACEAE

Reinstated by Christenhusz et al. (2011) for *Didymochlaena*, *Hypodematium*, and *Leucostegia*, after being included tentatively in the Dryopteridaceae by Smith et al. (2006); also see Schuettpelz & Pryer (2007). Brownlie (1977) included *Didymochlaena* in his Aspidiaceae and *Leucostegia* in the Davalliaceae.

DIDYMOCHLAENA Desv.

Didymochlaena truncatula (Sw.) J.Sm.

LEUCOSTEGIA C.Presl

Leucostegia pallida (Mett.) Copel.

DRYOPTERIDACEAE

The Dryopteridaceae, as construed by Smith et al. (2006), includes genera that were mostly placed in either the Aspidiaceae or Lomariopsidaceae (*Bolbitis*, *Elaphoglossum* and *Lomagramma*) by Brownlie (1977).

ACROPHORUS C.Presl

Acrophorus nodosus C.Presl
Listed as *A. blumei* Ching ex C.Chr. by Brownlie (1977) but *A. nodosus* is an earlier valid name (fide Parris et al. 1992).

ARACHNIODES Blume

Arachniodes aristata (G.Forst.) Tindale

BOLBITIS Schott

Bolbitis quoyana (Gaudich.) Ching is recorded for Fiji by Hennipman (1977), and listed by Jones (1998b) and Glenny (unpub.), but specifically excluded by Brownlie (1977, p. 6). It may have been confused with *B. vanuaensis.*

Bolbitis lonchophora (Kunze) C.Chr.

Included as *B. palustris* (Brack.) Hennipman by Brownlie (1977), but reduced to synonymy under *B. lonchophora* by Hennipman (1977). The author citation is given incorrectly as "(Fée) C.Chr." by Hennipman.

Bolbitis rivularis (Brack.) Ching in C.Chr.

Recorded as a hybrid (×*rivularis*) by NMNS (2008) but without any indication of parentage. Its status requires further investigation.

Bolbitis vanuaensis Brownlie

This species was described by Brownlie (1977) and may be the same species as that identified as *B. quoyana* by Hennipman and other authors, but the descriptions of the width of the fertile pinnae do not match. Requires further investigation.

CTENITIS (C.Chr.) C.Chr.

E ***Ctenitis fijiensis*** (Hook.) Copel.

E ^ ***Ctenitis minima*** Brownlie

The generic position of this species is unclear. It is known only from the type in US. Holttum (1985) suggested that it belonged in *Tectaria,* but there is an earlier homonym *T. minima* Underw.

^ ***Ctenitis subglandulosa*** (Hance) Ching

Recorded for Fiji, together with a description, by Holttum (1985). *DA 1745* in SUVA may be this species.

E ^ ***Ctenitis waiwaiensis*** (C.Chr.) Brownlie

The generic position of this species is unclear. It is known only from the type in K. Holttum (1985) suggested that it belongs in *Dryoathyrium* (= *Deparia* according to Smith et al. 2006), but it needs a new combination if transferred to *Deparia.* Brownlie (1977) thought its appearance was more suggestive of *Hypolepis.*

DRYOPTERIS Adans.

Dryopteris hasseltii (Blume) C.Chr.

Included under *Arachniodes* by Brownlie (1977) but now generally treated in *Dryopteris* (fide Parris et al. 1992).

^ ***Dryopteris hirtipes*** (Blume) Kuntze

Specimens cited by Brownlie (1977), including *Brownlie 911, 912* and *1814,* are in CHR! (CHR 338837, 338833, 338836, respectively).

Dryopteris maxima (Baker) C.Chr.

Treated in *Arachniodes* by Brownlie (1977), but in *Dryopteris* by NMNS (2008). Very similar to *Dryopteris arboreseens* (Baker) Kuntze from Samoa and the Solomon Islands (Christensen 1943; Glenny unpub.) and to *D. subarborea* (Christensen 1943, Brownlie 1977). It requires further investigation.

Dryopteris subarborea (Baker) C.Chr.

ELAPHOGLOSSUM Schott ex J.Sm.

Elaphoglossum is in urgent need of revision in the Pacific. Seven new species were described by Krajina (1938) and another by Brownlie (1977), but they are poorly defined and need reinterpreting with modern techniques. Some are known only from the type, others are endemic to individual islands.

E ***Elaphoglossum basitruncatum*** Brownlie

E ***Elaphoglossum dominii*** Krajina

Elaphoglossum feejeense Brack.

Elaphoglossum gillespiei Copel.

E ***Elaphoglossum imthurnii*** Krajina

Elaphoglossum milnei Krajina

E ^***Elaphoglossum ovalauense*** Krajina
Known only from the type in K.

LASTREOPSIS Ching

Lastreopsis davallioides (Brack.) Tindale

Lastreopsis tenera (R.Br.) Tindale

LOMAGRAMMA J.Sm.

Lomagramma cordipinna Holttum

Lomagramma polyphylla Brack.

POLYSTICHUM Roth.

Polystichum aff. ***moluccense*** (Blume) T.Moore (Fig. 1e)
Listed as *P. aculeatum* (L.) Roth by Brownlie (1977), but Parris (1994) and Glenny (unpub.) consider this species to be close to *P. moluccense* (Blume) T.Moore from the Moluccas, New Guinea and Solomon Islands. It also needs to be compared with material from Samoa (Christensen 1943).

E ***Polystichum pilosum*** Copel.

LOMARIOPSIDACEAE

Lomariopsidaceae, as construed by Smith et al. (2006), includes *Lomariopsis* and *Nephrolepis*, the latter previously included in the Davalliaceae by Brownlie (1977).

LOMARIOPSIS Fée

Lomariopsis brackenridgei Carruth.

Lomariopsis oleandrifolia (Brack.) Mett. in Kuhn

NEPHROLEPIS Schott

Nephrolepis biserrata (Sw.) Schott

Nephrolepis brownii (Desv.) Hovenkamp et Miyam.
Included within *N. hirsutula* by Brownlie (1977) but distinguished from that species by Hovenkamp & Miyamoto (2005) who recognise both species in Fiji and provide good descriptions.

Nephrolepis flexuosa Colenso
Treated as *N. tuberosa* (Bory ex Willd.) C.Presl by Brownlie (1977), but described as *N. cordifolia* var. *pseudolauterbachii* by Hovenkamp & Miyamoto (2005), based

on a Fijian type. Distinguished as a separate species by de Lange et al. (2005), with a distribution including Norfolk Island, New Zealand and Fiji, and accepted at that rank here.

Nephrolepis hirsutula (G.Forst.) C.Presl

Nephrolepis obliterata (R.Br.) J.Sm.

Recognised as the endemic *N. saligna* Carruth. by Brownlie (1977), but treated by Hovenkamp & Miyamoto (2005), and accepted here, as *N. obliterata*. Retained as *N. saligna* by NMNS (2008) although they also regard it as being in New Caledonia, Vanuatu, and Samoa.

TECTARIACEAE

Brownlie (1977) included *Arthropteris* in the Davalliaceae, and *Pleocnemia* and *Tectaria* in the Aspidiaceae. However, Smith et al. (2006) recognise them in the separate family Tectariaceae.

ARTHROPTERIS J.Sm. ex Hook.f.

Arthropteris articulata (Brack.) C.Chr.

^ ***Arthropteris beckleri*** (Hook.) Mett.

Collected and recorded by NMNS (2008) (TNS 9523476). A description is provided by Bell (1998).

Arthropteris repens (Brack.) C.Chr

Holttum (1966) recognised both *A. repens* and *A. palisotii* (Desv.) Alston as present in Fiji, albeit doubtfully. Brownlie (1977) and NMNS (2008) accepted only *A. repens*, but Bell (1998) reduced *A. repens* to synonymy under *A. palisotii*. The latter is the correct name for the taxon if only one species is recognised.

PLEOCNEMIA C.Presl

Pleocnemia in Malesia has been revised by Holttum (1991).

Pleocnemia cumingiana C.Presl

^ ***Pleocnemia elegans*** (Copel.) Holttum

Brownlie 1572, cited by Brownlie (1977), is in CHR (338869!).

Pleocnemia irregularis (C.Presl) Holttum

Pleocnemia leuzeana (Gaudich.) C.Presl

TECTARIA Cav.

Tectaria crenata Cav.

Tectaria decurrens (C.Presl) Copel.

Tectaria degeneri Copel.

^ ***Tectaria dissecta*** (G.Forst.) Lellinger

Known only from specimens in BISH, US and TNS.

E ***Tectaria godeffroyi*** (Luerss.) Copel. (Fig. 1f)

Tectaria hookeri Brownlie

Described as *T. hookerii* by Brownlie (1977), but here corrected to *T. hookeri*. A specimen in SUVA, needing further investigation, has similar dissection to this species, but differs in its anastomosing veins, and polished red brown stipe.

Tectaria latifolia (G.Forst.) Copel.

Tectaria menyanthidis (C.Presl) Copel.

[E] ***Tectaria nausoriensis*** Brownlie

Tectaria tripartita (Baker) Copel.

[E] ***Tectaria vitiensis*** Brownlie

OLEANDRACEAE

Oleandra was included within the Davalliaceae by Brownlie (1977), but is treated as a separate monogeneric family by Smith et al. (2006).

OLEANDRA Cav.

Oleandra neriiformis Cav.

Oleandra sibbaldii Grev.

^ ***Oleandra whitmeei*** Baker

Included under *O. sibbaldii* by Brownlie (1977) but both are recorded, illustrated and distinguished by NMNS (2008) (TNS 9521031).

^ ***Oleandra*** sp. 1

Collected, recorded and illustrated as an undescribed species by NMNS (2008) (TNS 9522051).

DAVALLIACEAE

Brownlie (1977) included several genera within his Davalliaceae, but *Arthropteris, Leucostegia, Nephrolepis* and *Oleandra* have now been transferred to Tectariaceae, Dryopteridaceae, Lomariopsidaceae and Oleandraceae, respectively (Smith et al. 2006). The remainder of Davalliaceae was revised by Kato & Tsutsumi (2008), who recognised five genera, with three in Fiji (*Davallia* Sm., *Humata* Cav., and *Wibelia* Bernh.). However, Christenhusz et al. (2011) indicate problems with the treatment of Kato & Tsutsumi (2008). These include an uncertain circumscription of *Davallia* sens. str. because the relationships of the type species have not been established, and the illegitimate adoption of *Wibelia* Bernh. when it is a later homonym of *Wibelia* G.Gaertn., B.Mey. et Scherb., a genus in the Asteraceae. Consequently, Christenhusz et al. (2011) advocate the recogniton of just two genera in the Davalliaceae, of which only *Davallia* occurs in Fiji. We follow this, but further investigation is clearly required.

DAVALLIA Sm.

Davallia epiphylla (G.Forst.) Spreng.

Reduced to synonymy with *D. denticulata* (Burm.f.) Mett. ex Kuhn by Nooteboom (1994). However, Glenny (unpub.) treats Fijian and Solomon Islands plants as *D. epiphylla*, distinct from *D. denticulata*, which he distinguishes as a closely related Malesian species lacking an acuminate lobe on the free margin of the indusium. Kato & Tsutsumi (2008) treat both species in *Wibelia* but do not detail their distributions. However, reinstatement of this genus is illegitimate (Christenhusz et al. 2011).

[E] ***Davallia fejeensis*** Hook.

Treated as a variety of *D. solida* by Nooteboom (1994). Further work is needed to determine whether there is just one polymorphic taxon.

Davallia heterophylla Sm.
Treated as *Humata heterophylla* (Sm.) Desv. by Brownlie (1977) and NMNS (2008).

Davallia pentaphylla Blume
Treated as *Scyphularia pycnocarpa* (Brack.) Copel. by Brownlie (1977) and NMNS (2008) but reduced to synonymy with *D. pentaphylla* by Nooteboom (1994). Kato & Tsutsumi (2008) do not list *D. pycnocarpa* Brack.

^ ***Davallia plumosa*** Baker
Recorded by NMNS (2008), but without citing a specimen, and distinguished from *D. solida*, which they also list for Fiji. Nooteboom (1994) reduces *D. plumosa* to synonymy with *D. solida*, but both are accepted by Kato & Tsutsumi (2008). The *D. solida* complex requires further investigation.

Davallia botrychioides (Brack.) Baker
Treated as *Humata botrychioides* Brack. by Brownlie (1977) and NMNS (2008), but synonymised with *D. repens* (L.f.) Kuhn by Nooteboom (1994). However, Kato & Tsutsumi (2008) recognise both species, under *Humata* (syn. *H. repens* (L.f.) Diels), but do not detail their distributions, and the relationship of these two species needs to be examined further.

Davallia sessilifolia Blume
Treated as *Humata polypodioides* by Brownlie (1977). Nooteboom (1994) synonymised this with *Davallia sessilifolia*. NMNS (2008) follow this synonymy, but place the species in *Humata*, as *H. sessilifolia* (Blume) Mett. However, Kato & Tsutsumi (2008) recognise both species, under *Humata*, but do not detail their distributions, and the relationship of these species needs to be examined further. The combination in *Davallia* for *Humata polypodioides* is preoccupied.

Davallia solida (G.Forst.) Sw.

POLYPODIACEAE

Brownlie (1977) recognised *Grammitis, Calymmodon* and *Ctenopteris* in a separate Grammitidaceae, but the grammitid ferns nest within Polypodiaceae and we follow Smith et al. (2006) by including them in one family. *Ctenopteris* and *Grammitis* are polyphyletic (Ranker et al. 2004), and Parris (2007, 2010) has created combinations in the new genera *Ctenopterella, Dasygrammitis, Oreograunmitis, Radiogrammitis*, and *Tomophyllum* for the Fijian species. Brownlie also included *Dipteris* in the Polypodiaceae but we follow Smith et al. (2006) by placing it in a separate family, Dipteridaceae.

AGLAOMORPHA Schott

^ ***Aglaomorpha drynarioides*** (Hook.) M.C.Roos
Included in *Merinthosorus* by Brownlie (1977) but reduced to synonymy in *Aglaomorpha* by Roos (1986). Known only from a single specimen in BISH from Cakaudrove.

BELVISIA Mirb.

Belvisia melanesica Brownlie
Described by Brownlie (1977) from Fiji but reduced to synonymy under *B. mucronata* by Hovenkamp & Franken (1993), although they did not see the type. However, Parris (1994) records it growing with *B. mucronata* on Taveuni, and it is accepted here.

Belvisia mucronata (Fée) Copel.

^ ***Belvisia spicata*** (L.f.) Mirb. ex Copel.
Recorded for Fiji by Hovenkamp & Franken (1993) and Glenny (unpub.). A description is given by Hovenkamp & Franken (1993).

CALYMMODON C.Presl

Calymmodon latealatus Copel.

CTENOPTERELLA Parris

Ctenopterella blechnoides (Grev.) Parris
Treated in *Ctenopteris* by Brownlie (1977).

E ***Ctenopterella seemannii*** (J.Sm.) Parris
Treated in *Ctenopteris* by Brownlie (1977).

^ ***Ctenopterella vodonaivalui*** (Brownlie) Parris
Described by Brownlie (1977) in *Ctenopteris.*

DASYGRAMMITIS Parris

Dasygrammitis crassifrons (Baker) Parris
Treated in *Ctenopteris* by Brownlie (1977).

DICTYMIA J.Sm.

Dictymia mckeei Tindale

DRYNARIA (Bory) J.Sm.

Drynaria rigidula (Sw.) Bedd.

GONIOPHLEBIUM (Blume) C.Presl

^ ***Goniophlebium persicifolium*** (Desv.) Bedd.
Collected and recorded by NMNS (2008) (TNS 9520083). A description is given by Hovenkamp et al. (1998).

Goniophlebium serratifolium Brack.

Recorded as *Polypodium subauriculatum* Blume by Brownlie (1977) but included in *Goniophlebium* by Hovenkamp et al. (1998). They list *G. serratifolium* for Fiji rather than *G. subauriculatum* (Blume) C.Presl with which it has been confused.

GRAMMITIS Sw.

Grammitis vanpelii (Brause) Copel.

OREOGRAMMITIS Copel.

^ ***Oreogrammitis adspersa*** (Blume) Parris
Recorded for Fiji as *Grammitis adspersa* (Blume) Blume by Parris (1983), and later transferred to *Oreogrammitis* (Parris 2007). A description is given by Parris (1983).

E ^ ***Oreogrammitis alta*** (Parris) Parris
Described by Brownlie (1977) as *G. stipitata*, but this is a later homonym of *G. stipitata* Proctor. Parris (1980) proposed *G. alta* as a *nomen novum* for this species, but it has now been transferred to *Oreogrammitis.* Known only from the holotype in CHR (338806!).

Oreogrammitis conformis (Brack.) Parris
Treated in *Grammitis* by Brownlie (1977).

[E] ***Oreogrammitis glabrata*** (Brownlie) Parris
Described by Brownlie (1977) in *Grammitis*. Known only from the type in SUVA and CHR (338804!).

Oreogrammitis knutsfordiana (Baker) Parris
Treated as *Grammitis hookeri* (Brack.) Copel. by Brownlie (1977) and NMNS (2008), but Fijian material is now included under *O. knutsfordiana* (Barbara Parris pers. comm., 7 April 2008).

Oreogrammitis pleurogrammoides (Rosenst.) Parris
Described by Brownlie (1977) as *Grammitis vitiensis*, but reduced to synonymy under *O. pleurogrammoides* by Parris (2007)

LEMMAPHYLLUM C.Presl

Lemmaphyllum accedens (Blume) Donk

LOXOGRAMME (Blume) C.Presl

Loxogramme parksii Copel.

MICROSORUM Link

The genus was listed as *Microsorium* by Brownlie (1977) but is correctly spelt *Microsorum*. Brownlie recognised both *Microsorum* and *Phymatosorus*, but we follow Nooteboom (1997) in accepting only the former.

[E] ***Microsorum alatum*** (Brack.) Copel.

Microsorum commutatum (Blume) Copel.
Recorded as *M. vitiense* (Baker) Copel. by Brownlie (1977) but reduced to synonymy under *M. commutatum* by Nooteboom (1997). NMNS treat the latter as *Phymatosorus commutatus* (Blume) Pic.Serm. but erroneously describe it as endemic to Fiji.

Microsorum grossum (Langsd. et Fisch.) S.B.Andrews
Recorded as *Phymatosorus grossus* (Langsd. et Fisch.) Brownlie by Brownlie (1977), but reduced to synonymy under *Microsorum scolopendria* by Nooteboom (1997). However, we follow Murdock & Smith (2003) and Bostock & Spokes (1998b) in retaining both species.

Microsorum linguiforme (Mett.) Copel.
Listed as *M. linguaeforme* by Brownlie (1977) but correctly spelt *M. linguiforme* (Nooteboom 1997).

Microsorum membranifolium (R.Br.) Ching
Recorded as *Phymatosorus nigrescens* (Blume) Pic.Serm. by Brownlie (1977), but reduced to synonymy under *Microsorum membranifolium* by Nooteboom (1997). NMNS (2008) treat the latter as *Phymatosorus membranifolius* (R.Br.) S.G.Lu.

[E] ***Microsorum parksii*** (Copel.) Copel.
Recognised in *Phymatosorus* by Brownlie (1977) but included in *Microsorum* by Nooteboom (1997).

Microsorum punctatum (L.) Copel.

Microsorum scolopendria (Burm.f.) Copel.
Recognised in *Phymatosorus* by Brownlie (1977) but included in *Microsorum* by Nooteboom (1997).

PROSAPTIA C.Presl

Prosaptia contigua (G.Forst.) C.Presl
Treated in *Ctenopteris* by Brownlie (1977).

[E] ^ ***Prosaptia immersa*** (Brownlie) Parris
Described by Brownlie (1977) in *Ctenopteris*. Known only from the holotype in CHR (338887!).

Prosaptia vomaensis (Brownlie) Parris
Described by Brownlie (1977) in *Ctenopteris*.

PYRROSIA Mirb.

Pyrrosia lanceolata (L.) Farw.
Recognised as *P. adnascens* (Sw.) Ching by Brownlie (1977) but reduced to synonymy under the widespread *P. lanceolata* by Hovenkamp (1986).

Pyrrosia serpens (G.Forst.) Ching
Recognised as *P. blepharolepis* (C.Chr.) Ching by Brownlie (1977) but reduced to synonymy under the Polynesian species *P. serpens* by Hovenkamp (1986).

RADIOGRAMMITIS Parris

Radiogrammitis hirtelloides (Copel.) Parris
Treated in *Grammitis* by Brownlie (1977).

SELLIGUEA Bory

Selliguea feeioides Copel.

TOMOPHYLLUM (E.Fourn.) Parris

[E] ***Tomophyllum hornei*** (Baker) Parris
Treated in *Ctenopteris* by Brownlie (1977).

Acknowledgments

This work was carried out by the authors as a subcontract between Landcare Research New Zealand Ltd (Client) and Te Papa (Consultant) in June 2008. The subcontract formed part of the project 'Plant reference collections and molecular-level systematics for biodiversity and biosecurity in the South Pacific' a Ministry of Research Science and Technology project funded by the New Zealand Overseas Development Agency Contestable Fund (New Zealand Aid Programme). It will contribute to capacity building in the South Pacific Regional Herbarium (SUVA) at the University of the South Pacific, Suva, Fiji.

We would like thank Grant Hunter at Landcare Research for negotiating this subcontract with Te Papa. We are also extremely grateful to Marika Tuiwawa, Alvereti Naikatini and the staff of the South Pacific Regional Herbarium for their generous hospitality in Suva, for providing excellent working space, for making the facilities of the herbarium available to us after hours, and for discussions on the Checklist presented here.

We are also grateful to David Glenny, Barbara Parris and Bill Sykes for discussions on the correct nomenclature for Pacific ferns, based on ther knowledge of the ferns of Malesia and the Pacific region.

References

Ballard, F. (1955) Ferns and fern allies: miscellaneous notes. *Kew Bulletin* 1954: 559–561.
Bell GH (1998) Davalliaceae. *Flora of Australia* 48: 434–450.
Bostock PD (1998a) Adiantaceae. *Flora of Australia* 48: 248–286.
Bostock PD (1998b) Thelypteridaceae. *Flora of Australia* 48: 327–358.
Bostock PD & Spokes TM (1998a) Hymenophyllaceae. *Flora of Australia* 48: 116–148.
Bostock PD & Spokes TM (1998b) Polypodiaceae. *Flora of Australia* 48: 468–495.
Brownlie G (1977) *The pteridophyte flora of Fiji.* (Cramer: Vaduz)
Brownsey PJ (1987) A review of the fern genus *Hypolepis* (Dennstaedtiaceae) in the Malesian and Pacific regions. *Blumea* 32: 227–276.
Brownsey PJ (2001) New Zealand's pteridophyte flora – plants of ancient lineage but recent arrival? *Brittonia* 53: 284–303.
Brownsey PJ & Perrie LR (2008) Updating Fijian fern names. Landcare Research IBG Report: LC0708/168 (unpublished). (Manaaki Whenua – Landcare Research: Christchurch, New Zealand)
Chambers TC & Farrant PA (1998) Cheilanthes. *Flora of Australia* 48: 271–286.
Chambers TC & Farrant PA (2001) Revision of *Blechnum* (Blechnaceae) in Malesia. *Blumea* 46: 283–350.
Chinnock RJ (1998a) Lycopodiaceae. *Flora of Australia* 48: 66–85.
Chinnock RJ (1998b) Psilotaceae. *Flora of Australia* 48: 47–53.
Chinnock RJ (1998c) Lygodiaceae. *Flora of Australia* 48: 183–187.
Christenhusz MJ, Xian-Chun Z, Schneider H (2011) A linear sequence of extant families and genera of lycophytes and ferns. *Phytotaxa* 19: 7–54.
Christensen C (1906) Index filicum. (Hagerup: Copenhagen)
Christensen C (1943) A revision of the Pteridophyta of Samoa. *B.P. Bishop Museum Bulletin* 177: 1–138.
Copeland EB (1929) Ferns of Fiji. *B.P. Bishop Museum Bulletin* 59: 1–105.
Copeland EB (1937) *Hymenophyllum. Philippine Journal of Science* 64: 1–188.
de Lange PJ, Gardner RO, Sykes WR, Crowcroft GM, Cameron EK, Stalker F, Christian M & Braggins JE (2005) Vascular flora of Norfolk Island; some additions and and taxonomic notes. *New Zealand Journal of Botany* 43: 563–596.
Ebihara A & Iwatsuki K (2007) The Hymenophyllaceae of the Pacific Area. 1. *Hymenophyllum* subgenus *Hymenophyllum*. *Bulletin of the National Museum of Natural Sciences, Series B* 33: 55–68.
Ebihara A, Dubuisson J-Y, Iwatsuki K, Hennequin S & Ito M (2006) A taxonomic revision of Hymenophyllaceae. *Blumea* 51: 221–280.
Gardner RO (1997) A concise account of *Selaginella* in Fiji. *New Zealand Journal of Botany* 35: 269–281.
Glenny D Ferns of the Solomon Islands. Unpublished manuscript, Te Papa, Wellington, New Zealand.
Hauke R (1963) A taxonomic monograph of the genus *Equisetum* subgenus *Hippochaete*. *Beihefte zur Nova Hedwigia* 8: 1–123.
Hennipman E (1977) A monograph of the fern genus *Bolbitis* (Lomariopsidaceae). *Leiden Botanical Series* 2: 1–331.
Holttum RE (1959) Gleicheniaceae. *Flora Malesiana* , Series II, 1: 1–36.
Holttum RE (1966) The genus *Arthropteris* J.Sm. in Malesia. *Blumea* 14: 225–229.
Holttum RE (1968) A re-definition of the fern genus *Taenitis*. *Blumea* 16: 87–95.

Holttum RE (1971) Studies in the family Thelypteridaceae III. A new system of genera in the Old World. *Blumea* 19: 17–52.
Holttum RE (1975) Studies in the family Thelypteridaceae VIII. The genera *Mesophlebion* and *Plesioneuron*. *Blumea* 22: 223–250.
Holttum RE (1977) The family Thelypteridaceae in the Pacific and Australasia. *Allertonia* 1: 169–234.
Holttum RE (1981) Thelypteridaceae. *Flora Malesiana*, Series II, 1: 331–599.
Holttum RE (1985) Studies in the fern genera allied to *Tectaria* Cav. IV. The genus *Ctenitis* in Asia, Malesia and the Western Pacific. *Blumea* 31: 1–38.
Holttum RE (1991) *Tectaria* group. *Flora Malesiana*, Series II, 2: 1–132.
Hovenkamp PH (1986) A monograph of the fern genus *Pyrrosia* (Polypodiaceae). *Leiden Botanical Series* 9: 1–280.
Hovenkamp PH, Saunders RMK, Lafferriere JE, Kato M, Zhang X & Nooteboom HP (1998) Polypodiaceae. *Flora Malesiana*, Series II, 3: 1–234.
Hovenkamp PH & Franken NAP (1993) An account of the fern genus *Belvisia* Mirbel (Polypodiaceae). *Blumea* 37: 511–527.
Hovenkamp PH & Miyamoto F (2005) A conspectus of the native and naturalized species of *Nephrolepis* (Nephrolepidaceae) in the world. *Blumea* 50: 279–322.
Jermy AC & Holmes JS (1998) Selaginellaceae. *Flora of Australia* 48: 85–95.
Jones DL (1998a) Athyriaceae. *Flora of Australia* 48: 418–429.
Jones DL (1998b) Lomariopsidaceae. *Flora of Australia* 48: 429–434.
Jones DL (1998c) Vittariaceae. *Flora of Australia* 48: 288–295.
Kato M (1984) A taxonomic study of the athyrioid fern genus *Deparia* with main reference to the Pacific species. *Journal of the Faculty of Science, University of Tokyo*, sect. III, 13: 375–429.
Kato M (1988) *Taenitis* and allied genera of Ambon and Seram (Moluccas) and notes on taxonomic and phytogeographic relationships of *Taenitis*. *Journal of the Faculty of Science, University of Tokyo*, sect. III, 14: 161–182.
Kato M & Tsutsumi C (2008) Generic classification of Davalliaceae. *Acta Phytotaxonomica et Geobotanica* 59: 1–14.
Krajina V (1938) Seven new Polynesian species of *Elaphoglossum* from the group *E. conforme* (Sw.) Schott. *Studia botanica Čechoslovaca* 1: 61–70.
Kramer KU (1970) The lindsaeoid ferns of the Old World V. The smaller Pacific islands. *Blumea* 18: 157–194.
Kramer KU & McCarthy PM (1998) Pteridaceae. *Flora of Australia* 48: 241–248.
Kramer KU & Zogg E (1988) *Pseudophegopteris* (Thelypteridaceae) in Fiji, a new record and a new species. *Blumea* 33: 423–426.
Large MF & Braggins JE (2004) *Tree ferns*. (CSIRO Publishing: Melbourne)
Lehtonen S, Tuomisto H, Rouhan G, Christenhusz MJM (2010) Phylogenetics and classification of the pantropical fern family Lindsaeaceae. *Botanical Journal of the Linnean Society* 163: 305–359.
Li H-L , Liu T-S, Huang T-C, Koyama T & DeVol CE (1975) *Flora of Taiwan . I. Pteridophyta and Gymnospermae*. (Epoch Publishing Co.: Taipei)
Maxon WR (1922) The genus *Culcita*. *Journal of the Washington Academy of Sciences* 12: 454–460.
Mickel JT & Smith AR (2004) The pteridophytes of Mexico. *Memoirs of the New York Botanical Garden* 188: 1–1054.
Mitchell DS (1972) The Kariba weed: *Salvinia molesta*. *British Fern Gazette* 10: 251–252.
Murdock AG & Smith AR (2003) Pteridophytes of Moorea, French Polynesia, with a new species, *Tmesipteris gracilis* (Psilotaceae). *Pacific Science* 57: 253–265.
National Museum of Nature and Science (eds) (2008) *Illustrated Flora of ferns and fern allies of South Pacific islands*. National Museum of Nature and Science Book Series No. 8. (Tokai University Press: Tokyo)
Nooteboom HP (1994) Notes on Davalliaceae II. A revision of the genus *Davallia*. *Blumea* 39: 151–214.

Nooteboom HP (1997) The microsoroid ferns (Polypodiaceae). *Blumea* 42: 261–395.
Øllgard B (1987) A revised classification of the Lycopodiaceae *sens. lat. Opera Botanica* 92: 153–178.
Parris BS (1980) Further notes on *Doodia*, *Grammitis* and *Blechnum*. *New Zealand Journal of Botany* 18: 145–147.
Parris BS (1983) A taxonomic revision of the genus *Grammitis* Swartz (Grammitidaceae: Filicales) in New Guinea. *Blumea* 29: 13–222.
Parris BS (1994) Additions to the pteridophyte flora of Taveuni, Fiji. *Fern Gazette* 14: 255–258.
Parris BS (1998) Doodia. *Flora of Australia* 48: 385–393.
Parris BS (2007) Five new genera and three new species of Grammitidaceae (Filicales) and the re-establishment of *Oreogrammitis*. *Gardens' Bulletin Singapore* 58: 233–274.
Parris BS (2010) New combinations in *Oreogrammitis*, *Prosaptia*, *Radiogrammitis*, *Themelium* and *Tomophyllum* (Grammitidaceae: Polypodiopsida: Monilophyta) from Malesia and the Pacific Islands. *Kew Bulletin* 65: 123–125.
Parris BS, Beaman RS & Beaman JH (1992) *The plants of Mount Kinabalu. I. Ferns and fern allies.* (Royal Botanic Gardens: Kew)
Pichi Sermolli REG (1991) The pteridological collections of the G.R.S.T.S. Expedition to the coastal region of north-eastern Queensland. *Webbia* 45: 317–379.
Ranker TA, Smith AR, Parris BS, Geiger JMO, Haufler CH, Straub SCK & Schneider H (2004) Phylogeny and evolution of the grammitid ferns (Grammitidaceae): a case of rampant morphological homoplasy. *Taxon* 53: 415–428.
Roos MC (1986) Phylogenetic systematics of the Drynarioideae (Polypodiaceae). *Verhandelingen van de Koninklijke Nederlandse Akademie van Wetenschappen, Afd. Natuurkunde, Tweed Reeks* 85: 1–318.
Schuettpelz E & Pryer KM (2007) Fern phylogeny inferred from 400 leptosporangiate species and three plastid genes. *Taxon* 56: 1037–1050.
Shepherd LD, Perrie LR, Parris BS & Brownsey PJ (2007) A molecular phylogeny for the New Zealand Blechnaceae ferns from analyses of chloroplast *trn*L-*trn*F DNA sequences. *New Zealand Journal of Botany* 45: 67–80.
Smith AR, Pryer KM, Schuettpelz E, Korall P, Schneider H & Wolf PG (2006) A classification for extant ferns. *Taxon* 55: 705–731.
Thiers B (2011) Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. http://sweetgum.nybg.org/ih/
White RA & Turner MD (1988) *Calochlaena*, a new genus of dicksonioid ferns. *American Fern Journal* 78: 86–95.
Yoroi R & Iwatsuki K (1977) An observation on the variation of *Trichomanes minutum* and allied species. *Acta Phytotaxonomica Geobotanica* 28: 152–159.

Manuscript received 23 November 2010, accepted 20 July 2011

Appendix 1. Index of names used by Brownlie (1977)

Name used in Brownlie (1977)	Currently accepted name	Current family
Acrophorus blumei Ching ex C.Chr.	*Acrophorus nodosus* C.Presl	Dryopteridaceae
Acrostichum aureum L.	*Acrostichum aureum* L.	Pteridaceae
Adiantum diaphanum Blume	*Adiantum diaphanum* Blume	Pteridaceae
Adiantum hispidulum Sw.	*Adiantum hispidulum* Sw.	Pteridaceae
Adiantum hornei Baker	*Adiantum hornei* Baker	Pteridaceae
Adiantum philippense L.	*Adiantum philippense* L.	Pteridaceae
Angiopteris evecta (G.Forst.) Hoffm.	*Angiopteris evecta* (G.Forst.) Hoffm.	Marattiaceae
Angiopteris opaca Copel.	*Angiopteris opaca* Copel.	Marattiaceae
Antrophyum alatum Brack.	*Antrophyum alatum* Brack.	Pteridaceae
Antrophyum plantagineum (Cav.) Kaulf.	*Antrophyum plantagineum* (Cav.) Kaulf.	Pteridaceae
Antrophyum semicostatum Blume	*Antrophyum semicostatum* Blume	Pteridaceae
Antrophyum smithii C.Chr. in A.C.Sm.	*Antrophyum smithii* C.Chr. in A.C.Sm.	Pteridaceae
Antrophyum subfalcatum Brack.	*Antrophyum subfalcatum* Brack.	Pteridaceae
Arachniodes aristata (G.Forst.) Tindale	*Arachniodes aristata* (G.Forst.) Tindale	Dryopteridaceae
Arachniodes hasseltii (Blume) Ching	*Dryopteris hasseltii* (Blume) C.Chr.	Dryopteridaceae
Arachniodes maxima (Baker) Brownlie	*Dryopteris maxima* (Baker) C.Chr.	Dryopteridaceae
Arthropteris articulata (Brack.) C.Chr.	*Arthropteris articulata* (Brack.) C.Chr.	Tectariaceae
Arthropteris repens (Brack.) C.Chr.	*Arthropteris repens* (Brack.) C.Chr.	Tectariaceae
Asplenium amboinense Willd.	*Asplenium amboinense* Willd.	Aspleniaceae
Asplenium australasicum Hook.	*Asplenium australasicum* Hook.	Aspleniaceae

Asplenium bipinnatifidum Baker	*Asplenium bipinnatifidum* Baker	Aspleniaceae
Asplenium carruthersii Baker	*Asplenium carruthersii* Baker	Aspleniaceae
Asplenium caudatum G.Forst.	*Asplenium caudatum* G.Forst.	Aspleniaceae
Asplenium cuneatum Lam.	*Asplenium cuneatum* Lam.	Aspleniaceae
Asplenium excisum C.Presl	*Hymenasplenium excisum* (C.Presl) S.Linds.	Aspleniaceae
Asplenium induratum Hook.	*Asplenium induratum* Hook.	Aspleniaceae
Asplenium insiticium Brack.	*Asplenium insiticium* Brack.	Aspleniaceae
Asplenium laserpitiifolium Lam.	*Asplenium laserpitiifolium* Lam.	Aspleniaceae
Asplenium marattioides (Brack.) C.Chr.	*Asplenium marattioides* (Brack.) C.Chr.	Aspleniaceae
Asplenium nidus L.	*Asplenium nidus* L.	Aspleniaceae
Asplenium polyodon G.Forst.	*Asplenium polyodon* G.Forst.	Aspleniaceae
Asplenium tenerum G.Forst.	*Asplenium tenerum* G.Forst.	Aspleniaceae
Asplenium unilaterale Lam.	*Hymenasplenium unilaterale* (Lam.) Hayata	Aspleniaceae
Belvisia melanesica Brownlie	*Belvisia melanesica* Brownlie	Polypodiaceae
Belvisia mucronata (Fée) Copel.	*Belvisia mucronata* (Fée) Copel.	Polypodiaceae
Blechnum coriaceum (Brack.) Brownlie	*Blechnum melanocaulon* (Brack.) T.C.Chambers et P.A.Farrant	Blechnaceae
Blechnum difforme Copel.	*Blechnum difforme* Copel.	Blechnaceae
Blechnum doodioides (Brack.) Brownlie	*Blechnum chambersii* Tindale	Blechnaceae
Blechnum gibbum (Labill.) Mett.	*Blechnum gibbum* (Labill.) Mett.	Blechnaceae
Blechnum milnei (Carruth.) C.Chr.	*Blechnum milnei* (Carruth.) C.Chr.	Blechnaceae
Blechnum orientale L.	*Blechnum orientale* L.	Blechnaceae
Blechnum pilosum (Brack.) Brownlie	*Blechnum pilosum* (Brack.) Brownlie	Blechnaceae
Blechnum vittatum Brack.	*Blechnum vittatum* Brack.	Blechnaceae
Bolbitis palustris (Brack.) Hennipman	*Bolbitis lonchophora* (Kunze) C.Chr.	Dryopteridaceae

Name used in Brownlie (1977)	Currently accepted name	Current family
Bolbitis rivularis (Brack.) Ching in C.Chr.	*Bolbitis rivularis* (Brack.) Ching in C.Chr.	Dryopteridaceae
Bolbitis vanuaensis Brownlie	*Bolbitis vanuaensis* Brownlie	Dryopteridaceae
Botrychium daucifolium Wall. ex Hook. et Grev.	*Botrychium daucifolium* Wall. ex Hook. et Grev.	Ophioglossaceae
Calymmodon latealatus Copel.	*Calymmodon latealatus* Copel.	Polypodiaceae
Ceratopteris thalictroides (L.) Brongn.	*Ceratopteris thalictroides* (L.) Brongn.	Pteridaceae
Cheilanthes farinosa (Forssk.) Kaulf.	*Cheilanthes farinosa* (Forssk.) Kaulf.	Pteridaceae
Cheilanthes hirsuta (Poir.) Mett.	*Cheilanthes nudiuscula* (R.Br.) T.Moore	Pteridaceae
Cheilanthes tenuifolia (Burm.f.) Sw.	*Cheilanthes tenuifolia* (Burm.f.) Sw.	Pteridaceae
Christella arida (D.Don) Holttum	*Christella arida* (D.Don) Holttum	Thelypteridaceae
Christella dentata (Forssk.) Brownsey et Jermy	*Christella dentata* (Forssk.) Brownsey et Jermy	Thelypteridaceae
Christella harveyi (Mett.) Holttum	*Christella harveyi* (Mett.) Holttum	Thelypteridaceae
Christella pacifica Holttum	*Christella pacifica* Holttum	Thelypteridaceae
Christella parasitica (L.) H.Lév.	*Christella parasitica* (L.) H.Lév.	Thelypteridaceae
Christella subpubescens (Blume) Holttum	*Christella subpubescens* (Blume) Holttum	Thelypteridaceae
Coniogramme fraxinea (D.Don) Diels	*Coniogramme fraxinea* (D.Don) Diels	Pteridaceae
Coryphopteris seemannii Holttum	*Coryphopteris seemannii* Holttum	Thelypteridaceae
Coryphopteris vitiensis Holttum	*Coryphopteris vitiensis* Holttum	Thelypteridaceae
Ctenitis fijiensis (Hook.) Copel.	*Ctenitis fijiensis* (Hook.) Copel.	Dryopteridaceae
Ctenitis minima Brownlie	"*Ctenitis minima* Brownlie"	Tectariaceae?
Ctenitis waiwaiensis (C.Chr.) Brownlie	"*Ctenitis waiwaiensis* (C.Chr.) Brownlie"	Woodsiaceae?
Ctenopteris blechnoides (Grev.) W.H.Wagner et Grether	*Ctenopterella blechnoides* (Grev.) Parris	Polypodiaceae
Ctenopteris contigua (G.Forst.) Holttum	*Prosaptia contigua* (G.Forst.) C.Presl	Polypodiaceae

Ctenopteris crassifrons (Baker) Brownlie	*Dasygrammitis crassifrons* (Baker) Parris	Polypodiaceae
Ctenopteris hornei (Baker) Brownlie	*Tomophyllum hornei* (Baker) Parris	Polypodiaceae
Ctenopteris immersa Brownlie	*Prosaptia immersa* (Brownlie) Parris	Polypodiaceae
Ctenopteris seemannii (J.Sm.) Copel.	*Ctenopterella seemannii* (J.Sm.) Parris	Polypodiaceae
Ctenopteris vodonaivalui Brownlie	*Ctenopterella vodonaivalui* (Brownlie) Parris	Polypodiaceae
Ctenopteris vomaensis Brownlie	*Prosaptia vomaensis* (Brownlie) Parris	Polypodiaceae
Culcita straminea (Labill.) Maxon	*Calochlaena straminea* (Labill.) M.D.Turner et R.A.White	Dicksoniaceae
Cyathea affinis (G.Forst.) Sw.	*Cyathea affinis* (G.Forst.) Sw.	Cyatheaceae
Cyathea alta Copel.	*Cyathea alta* Copel.	Cyatheaceae
Cyathea decurrens (Hook.) Copel.	*Cyathea decurrens* (Hook.) Copel.	Cyatheaceae
Cyathea hornei (Baker) Copel.	*Cyathea hornei* (Baker) Copel.	Cyatheaceae
Cyathea lunulata (G.Forst.) Copel. subsp. *vitiensis* (Carruth.) Holttum	*Cyathea lunulata* (G.Forst.) Copel. subsp. *vitiensis* (Carruth.) Holttum	Cyatheaceae
Cyathea medullaris (G.Forst.) Sw.	*Cyathea medullaris* (G.Forst.) Sw.	Cyatheaceae
Cyathea microlepidota Copel.	*Cyathea microlepidota* Copel.	Cyatheaceae
Cyathea plagiostegia Copel.	*Cyathea plagiostegia* Copel.	Cyatheaceae
Cyathea propinqua Mett.	*Cyathea propinqua* Mett.	Cyatheaceae
Cyathea subsessilis Copel.	*Cyathea subsessilis* Copel.	Cyatheaceae
Cyathea truncata (Brack.) Copel.	*Cyathea truncata* (Brack.) Copel.	Cyatheaceae
Cyclosorus decadens (Baker) Ching	*Sphaerostephanos decadens* (Baker) Holttum	Thelypteridaceae
Cyclosorus suprastrigosus (Rosenst.) Copel.	*Sphaerostephanos heterocarpus* (Blume) Holttum	Thelypteridaceae
Cyclosorus tottus (Thunb.) Pic.Serm.	*Cyclosorus interruptus* (Willd.) H.Itô	Thelypteridaceae
Davallia epiphylla (G.Forst.) Spreng.	*Davallia epiphylla* (G.Forst.) Spreng.	Davalliaceae
Davallia fejeensis Hook.	*Davallia fejeensis* Hook.	Davalliaceae

Name used in Brownlie (1977)	Currently accepted name	Current family
Davallia solida (G.Forst.) Sw.	*Davallia solida* (G.Forst.) Sw.	Davalliaceae
Dennstaedtia flaccida (G.Forst.) Bernh.	*Dennstaedtia flaccida* (G.Forst.) Bernh.	Dennstaedtiaceae
Dennstaedtia glabrata (Ces.) C.Chr.	*Dennstaedtia glabrata* (Ces.) C.Chr.	Dennstaedtiaceae
Dennstaedtia inermis (Baker) Brownlie	*Dennstaedtia inermis* (Baker) Brownlie	Dennstaedtiaceae
Dicksonia brackenridgei Mett.	*Dicksonia brackenridgei* Mett.	Dicksoniaceae
Dicranopteris caudata (Copel.) H.St.John	*Dicranopteris caudata* (Copel.) H.St.John	Gleicheniaceae
Dicranopteris linearis (Burm.f.) Underw.	*Dicranopteris linearis* (Burm.f.) Underw.	Gleicheniaceae
Dictymia mckeei Tindale	*Dictymia mckeei* Tindale	Polypodiaceae
Didymochlaena truncatula (Sw.) J.Sm.	*Didymochlaena truncatula* (Sw.) J.Sm.	Hypodematiaceae
Diplaziopsis javanica (Blume) C.Chr.	*Diplaziopsis javanica* (Blume) C.Chr.	Woodsiaceae
Diplazium bulbiferum Brack.	*Diplazium bulbiferum* Brack.	Woodsiaceae
Diplazium dilatatum Blume	*Diplazium dilatatum* Blume	Woodsiaceae
Diplazium echinatum C.Chr.	*Diplazium echinatum* C.Chr.	Woodsiaceae
Diplazium esculentum (Retz.) Sw.	*Diplazium dietrichianum* (Luerss.) C.Chr.	Woodsiaceae
Diplazium harpeodes T.Moore	*Diplazium harpeodes* T.Moore	Woodsiaceae
Diplazium melanocaulon Brack. var. *melanocaulon*	*Diplazium melanocaulon* Brack. var. *melanocaulon*	Woodsiaceae
Diplazium melanocaulon Brack. var. *coriaceum* (Carruth. ex Seem.) Brownlie	*Diplazium melanocaulon* Brack. var. *coriaceum* (Carruth. ex Seem.) Brownlie	Woodsiaceae
Diplazium proliferum (Lam.) Thouars	*Diplazium proliferum* (Lam.) Kaulf.	Woodsiaceae
Dipteris conjugata Reinw.	*Dipteris conjugata* Reinw.	Dipteridaceae
Doodia brackenridgei Carruth. ex Seem.	*Doodia brackenridgei* Carruth. ex Seem.	Blechnaceae
Doryopteris concolor (Langsd. et Fisch.) Kuhn	*Doryopteris concolor* (Langsd. et Fisch.) Kuhn	Pteridaceae
Drynaria rigidula (Sw.) Bedd.	*Drynaria rigidula* (Sw.) Bedd.	Polypodiaceae

Dryopteris hirtipes (Blume) Kuntze	*Dryopteris hirtipes* (Blume) Kuntze	Dryopteridaceae
Dryopteris subarborea (Baker) C.Chr.	*Dryopteris subarborea* (Baker) C.Chr.	Dryopteridaceae
Elaphoglossum basitruncatum Brownlie	*Elaphoglossum basitruncatum* Brownlie	Dryopteridaceae
Elaphoglossum dominii Krajina	*Elaphoglossum dominii* Krajina	Dryopteridaceae
Elaphoglossum feejeense Brack.	*Elaphoglossum feejeense* Brack.	Dryopteridaceae
Elaphoglossum gillespiei Copel.	*Elaphoglossum gillespiei* Copel.	Dryopteridaceae
Elaphoglossum imthurnii Krajina	*Elaphoglossum imthurnii* Krajina	Dryopteridaceae
Elaphoglossum milnei Krajina	*Elaphoglossum milnei* Krajina	Dryopteridaceae
Elaphoglossum ovalauense Krajina	*Elaphoglossum ovalauense* Krajina	Dryopteridaceae
Equisetum ramossisimum Desf.	*Equisetum ramosissimum* Desf. subsp. ***debile*** (Roxb.) Hauke	Equisetaceae
Gleichenia longissima Blume	*Diplopterygium longissimum* (Blume) Nakai	Gleicheniaceae
Gleichenia oceanica Kuhn	*Sticherus oceanicus* (Kuhn) H.St.John	Gleicheniaceae
Grammitis conformis (Brack.) J.Sm.	*Oreogrammitis conformis* (Brack.) Parris	Polypodiaceae
Grammitis glabrata Brownlie	*Oreogrammitis glabrata* (Brownlie) Parris	Polypodiaceae
Grammitis hirtelloides (Copel.) Copel.	*Radiogrammitis hirtelloides* (Copel.) Parris	Polypodiaceae
Grammitis hookeri (Brack.) Copel.	*Oreogrammitis knutsfordiana* (Baker) Parris	Polypodiaceae
Grammitis stipitata Brownlie	*Oreogrammitis alta* (Parris) Parris	Polypodiaceae
Grammitis vaupelii (Brause) Copel.	*Grammitis vaupelii* (Brause) Copel.	Polypodiaceae
Grammitis vitiensis Brownlie	*Oreogrammitis pleurogrammoides* (Rosenst.) Parris	Polypodiaceae
Histiopteris incisa (Thunb.) J.Sm.	*Histiopteris incisa* (Thunb.) J.Sm.	Dennstaedtiaceae
Histiopteris sinuata (Brack.) J.Sm.	*Histiopteris sinuata* (Brack.) J.Sm.	Dennstaedtiaceae
Humata botrychioides Brack.	*Davallia botrychioides* (Brack.) Baker	Davalliaceae
Humata heterophylla (Sm.) Desv.	*Davallia heterophylla* Sm.	Davalliaceae
Humata polypodioides Brack.	*Davallia sessilifolia* Blume	Davalliaceae

Name used in Brownlie (1977)	Currently accepted name	Current family
Hymenophyllum affine Brack.	*Hymenophyllum holochilum* (Bosch) C.Chr.	Hymenophyllaceae
Hymenophyllum denticulatum Sw.	*Hymenophyllum denticulatum* Sw.	Hymenophyllaceae
Hymenophyllum feejeense Brack.	*Hymenophyllum feejeense* Brack.	Hymenophyllaceae
Hymenophyllum flabellatum Labill.	*Hymenophyllum flabellatum* Labill.	Hymenophyllaceae
Hymenophyllum imbricatum Blume	*Hymenophyllum imbricatum* Blume	Hymenophyllaceae
Hymenophyllum javanicum Spreng.	*Hymenophyllum javanicum* Spreng.	Hymenophyllaceae
Hymenophyllum polyanthos Sw.	*Hymenophyllum polyanthos* (Sw.) Sw.	Hymenophyllaceae
Hymenophyllum samoense Baker	*Hymenophyllum javanicum* Spreng.	Hymenophyllaceae
Hypolepis elegans Carruth.	*Hypolepis elegans* Carruth.	Dennstaedtiaceae
Hypolepis nausoriensis Brownlie	*Hypolepis tenuifolia* (G.Forst.) Bernh. ex C.Presl	Dennstaedtiaceae
Lastreopsis davallioides (Brack.) Tindale	*Lastreopsis davallioides* (Brack.) Tindale	Dryopteridaceae
Lastreopsis tenera (R.Br.) Tindale	*Lastreopsis tenera* (R.Br.) Tindale	Dryopteridaceae
Lemmaphyllum accedens (Blume) Donk	*Lemmaphyllum accedens* (Blume) Donk	Polypodiaceae
Leptopteris wilkesiana (Brack.) Christ	*Leptopteris wilkesiana* (Brack.) Christ	Osmundaceae
Leucostegia pallida (Mett.) Copel.	*Leucostegia pallida* (Mett.) Copel.	Hypodematiaceae
Lindsaea ensifolia Sw. subsp. *agatii* (Brack.) K.U.Kramer	*Lindsaea agatii* (Brack.) Lehtonen et Tuomisto	Lindsaeaceae
Lindsaea gueriniana (Gaudich.) Desv.	*Lindsaea gueriniana* (Gaudich.) Desv.	Lindsaeaceae
Lindsaea harveyi Carruth. ex Seem.	*Lindsaea harveyi* Carruth. ex Seem.	Lindsaeaceae
Lindsaea lapeyrousii (Hook.) Baker subsp. *fijiensis* K.U.Kramer	*Lindsaea lapeyrousei* (Hook.) Baker	Lindsaeaceae
Lindsaea moorei (Hook.) E.Fourn.	*Lindsaea moorei* (Hook.) E.Fourn.	Lindsaeaceae
Lindsaea obtusa J.Sm. ex Hook.	*Lindsaea obtusa* J.Sm. ex Hook.	Lindsaeaceae
Lindsaea pacifica K.U.Kramer	*Lindsaea pacifica* K.U.Kramer	Lindsaeaceae
Lindsaea pickeringii (Brack.) Mett. ex Kuhn	*Lindsaea pickeringii* (Brack.) Mett. ex Kuhn	Lindsaeaceae

Lindsaea propinqua Hook. in Night.	*Lindsaea propinqua* Hook. in Night.	Lindsaeaceae
Lindsaea pulchra (Brack.) Carruth. ex Seem. var. *protracta* (Copel.) Brownlie	*Lindsaea pulchra* (Brack.) Carruth. ex Seem. var. *protracta* (Copel.) Brownlie	Lindsaeaceae
Lindsaea pulchra (Brack.) Carruth. ex Seem. var. *pulchra*	*Lindsaea pulchra* (Brack.) Carruth. ex Seem. var. *pulchra*	Lindsaeaceae
Lindsaea repens (Bory) Thwaites var. *marquesensis* E.D.Br.	*Lindsaea repens* (Bory) Thwaites var. *marquesensis* E.D.Br.	Lindsaeaceae
Lindsaea repens (Bory) Thwaites var. *sessilis* (Copel.) K.U.Kramer	*Lindsaea repens* (Bory) Thwaites var. *sessilis* (Copel.) K.U.Kramer	Lindsaeaceae
Lindsaea rigida J.Sm.	*Lindsaea rigida* J.Sm.	Lindsaeaceae
Lindsaea tetragona K.U.Kramer	*Lindsaea tetragona* K.U.Kramer	Lindsaeaceae
Lindsaea vitiensis K.U.Kramer	*Lindsaea vitiensis* K.U.Kramer	Lindsaeaceae
Lomagramma cordipinna Holttum	*Lomagramma cordipinna* Holttum	Dryopteridaceae
Lomagramma polyphylla Brack.	*Lomagramma polyphylla* Brack.	Dryopteridaceae
Lomariopsis brackenridgei Carruth.	*Lomariopsis brackenridgei* Carruth.	Lomariopsidaceae
Lomariopsis oleandrifolia (Brack.) Mett. in Kuhn	*Lomariopsis oleandrifolia* (Brack.) Mett. in Kuhn	Lomariopsidaceae
Loxogramme parksii Copel.	*Loxogramme parksii* Copel.	Polypodiaceae
Loxoscaphe foeniculaceum (Hook.) T.Moore	*Asplenium stenolobum* C.Chr	Aspleniaceae
Loxoscaphe gibberosum (G.Forst.) T.Moore	*Asplenium gibberosum* (G.Forst.) Mett.	Aspleniaceae
Lunathyrium boryanum (Willd.) H.Ohba	*Deparia boryana* (Willd.) M.Kato	Woodsiaceae
Lunathyrium gillespiei (Copel.) Brownlie	*Diplazium gillespiei* (Copel.) M.Kato	Woodsiaceae
Lunathyrium gordonii (Baker) Brownlie	*Deparia gordonii* (Baker) M.Kato	Woodsiaceae
Lunathyrium japonicum (Thunb.) Sa.Kurata	*Deparia petersenii* (Kunze) M.Kato	Woodsiaceae
Lycopodium carinatum Desv.	*Huperzia carinata* (Desv. ex Poir.) Trevis.	Lycopodiaceae
Lycopodium cernuum L.	*Lycopodiella cernua* (L.) Pic.Serm.	Lycopodiaceae
Lycopodium clavatum L.	*Lycopodium clavatum* L.	Lycopodiaceae
Lycopodium foliosum Copel.	*Huperzia foliosa* (Copel.) Holub	Lycopodiaceae

Name used in Brownlie (1977)	Currently accepted name	Current family
Lycopodium magnificum Brownlie	*Huperzia magnifica* (Brownlie) Holub	Lycopodiaceae
Lycopodium melanesicum Brownlie	*Huperzia melanesica* (Brownlie) Holub	Lycopodiaceae
Lycopodium nummularifolium Blume	*Huperzia nummulariifolia* (Blume) Jermy	Lycopodiaceae
Lycopodium parksii Copel.	*Huperzia parksii* (Copel.) Holub	Lycopodiaceae
Lycopodium phlegmaria L.	*Huperzia phlegmaria* (L.) Rothm.	Lycopodiaceae
Lycopodium phyllanthum Hook. et Arn.	*Huperzia phyllantha* (Hook. et Arn.) Holub	Lycopodiaceae
Lycopodium serratum Thunb.	*Huperzia serrata* (Thunb. ex Murray) Trevis.	Lycopodiaceae
Lycopodium squarrosum G.Forst.	*Huperzia squarrosa* (G.Forst.) Trevis.	Lycopodiaceae
Lycopodium subtrifoliatum Brownlie	*Huperzia subtrifoliata* (Brownlie) Holub	Lycopodiaceae
Lycopodium trifoliatum Copel.	*Huperzia trifoliata* (Copel.) Holub	Lycopodiaceae
Lygodium reticulatum Schkuhr	*Lygodium reticulatum* Schkuhr	Lygodiaceae
Macrothelypteris polypodioides (Hook.) Holttum	*Macrothelypteris polypodioides* (Hook.) Holttum	Thelypteridaceae
Macrothelypteris torresiana (Gaudich.) Ching	*Macrothelypteris torresiana* (Gaudich.) Ching	Thelypteridaceae
Marattia smithii Mett. ex Kuhn	*Ptisana smithii* (Mett. ex Kuhn) Murdock	Marattiaceae
Merinthosorus drynarioides (Hook.) Copel.	*Aglaomorpha drynarioides* (Hook.) M.C.Roos	Polypodiaceae
Microlepia speluncae (L.) T.Moore	*Microlepia speluncae* (L.) T.Moore	Dennstaedtiaceae
Microlepia strigosa (Thunb.) C.Presl	*Microlepia strigosa* (Thunb.) C.Presl	Dennstaedtiaceae
Microlepia vitiensis Brownlie	*Microlepia vitiensis* Brownlie	Dennstaedtiaceae
Microsorium alatum (Brack.) Copel.	*Microsorum alatum* (Brack.) Copel.	Polypodiaceae
Microsorium linguaeforme (Mett.) Copel.	*Microsorum linguiforme* (Mett.) Copel.	Polypodiaceae
Microsorium punctatum (L.) Copel.	*Microsorum punctatum* (L.) Copel.	Polypodiaceae
Microsorium vitiense (Baker) Copel.	*Microsorum commutatum* (Blume) Copel.	Polypodiaceae
Nephrolepis biserrata (Sw.) Schott	*Nephrolepis biserrata* (Sw.) Schott	Lomariopsidaceae

Nephrolepis hirsutula (G.Forst.) C.Presl	*Nephrolepis hirsutula* (G.Forst.) C.Presl	Lomariopsidaceae
Nephrolepis saligna Carruth.	*Nephrolepis obliterata* (R.Br.) J.Sm.	Lomariopsidaceae
Nephrolepis tuberosa (Bory ex Willd.) C.Presl	*Nephrolepis flexuosa* Colenso	Lomariopsidaceae
Oleandra neriiformis Cav.	*Oleandra neriiformis* Cav.	Oleandraceae
Oleandra sibbaldii Grev.	*Oleandra sibbaldii* Grev.	Oleandraceae
Ophioglossum pendulum L.	*Ophioglossum pendulum* L.	Ophioglossaceae
Ophioglossum petiolatum Hook.	*Ophioglossum petiolatum* Hook.	Ophioglossaceae
Ophioglossum reticulatum L.	*Ophioglossum reticulatum* L.	Ophioglossaceae
Orthiopteris ferulacea (T.Moore) Copel.	*Saccoloma ferulaceum* (T.Moore) R.M.Tryon et A.F.Tryon	Saccolomataceae
Orthiopteris tenuis (Brack.) Brownlie	*Saccoloma tenue* (Brack.) Mett.	Saccolomataceae
Phymatosorus grossus (Langsd. et Fisch.) Brownlie	*Microsorum grossum* (Langsd. et Fisch.) S.B.Andrews	Polypodiaceae
Phymatosorus nigrescens (Blume) Pic.Serm.	*Microsorum membranifolium* (R.Br.) Ching	Polypodiaceae
Phymatosorus parksii (Copel.) Brownlie	*Microsorum parksii* (Copel.) Copel.	Polypodiaceae
Phymatosorus scolopendria (Burm.f.) Pic.Serm.	*Microsorum scolopendria* (Burm.f.) Copel.	Polypodiaceae
Pleocnemia cumingiana C.Presl	*Pleocnemia cumingiana* C.Presl	Tectariaceae
Pleocnemia elegans (Copel.) Holttum	*Pleocnemia elegans* (Copel.) Holttum	Tectariaceae
Pleocnemia irregularis (C.Presl) Holttum	*Pleocnemia irregularis* (C.Presl) Holttum	Tectariaceae
Pleocnemia leuzeana (Gaudich.) C.Presl	*Pleocnemia leuzeana* (Gaudich.) C.Presl	Tectariaceae
Plesioneuron archboldiae (Copel.) Holttum	*Plesioneuron archboldiae* (Copel.) Holttum	Thelypteridaceae
Plesioneuron hopeanum (Baker) Holttum	*Plesioneuron hopeanum* (Baker) Holttum	Thelypteridaceae
Plesioneuron prenticei (Carruth.) Holttum	*Plesioneuron prenticei* (Carruth.) Holttum	Thelypteridaceae
Pneumatopteris costata (Brack.) Holttum	*Pneumatopteris costata* (Brack.) Holttum	Thelypteridaceae
Pneumatopteris magnifica (Copel.) Holttum	*Pneumatopteris magnifica* (Copel.) Holttum	Thelypteridaceae
Pneumatopteris parksii (F.Ballard) Holttum	*Pneumatopteris parksii* (F.Ballard) Holttum	Thelypteridaceae

Name used in Brownlie (1977)	Currently accepted name	Current family
Polypodium subauriculatum Blume	*Goniophlebium serratifolium* Brack.	Polypodiaceae
Polystichum aculeatum (L.) Roth	*Polystichum* aff. *moluccense* (Blume) T.Moore	Dryopteridaceae
Polystichum pilosum Copel.	*Polystichum pilosum* Copel.	Dryopteridaceae
Pronephrium beccarianum (Ces.) Holttum	*Pronephrium beccarianum* (Ces.) Holttum	Thelypteridaceae
Pronephrium rubrinerve (Mett.) Holttum	*Pronephrium rubrinerve* (Mett.) Holttum	Thelypteridaceae
Pronephrium triphyllum (Sw.) Holttum	*Pronephrium triphyllum* (Sw.) Holttum	Thelypteridaceae
Psilotum complanatum Sw.	*Psilotum complanatum* Sw.	Psilotaceae
Psilotum nudum (L.) P.Beauv.	*Psilotum nudum* (L.) P.Beauv.	Psilotaceae
Pteridium esculentum (G.Forst.) Cockayne	*Pteridium esculentum* (G.Forst.) Cockayne	Dennstaedtiaceae
Pteris comans G.Forst.	*Pteris comans* G.Forst.	Pteridaceae
Pteris ensiformis Burm.f.	*Pteris ensiformis* Burm.f.	Pteridaceae
Pteris excelsa Gaudich.	*Pteris excelsa* Gaudich.	Pteridaceae
Pteris litoralis Rech.	*Pteris litoralis* Rech.	Pteridaceae
Pteris mertensioides Willd.	*Pteris mertensioides* Willd.	Pteridaceae
Pteris pacifica Hieron.	*Pteris pacifica* Hieron.	Pteridaceae
Pteris parhamii Brownlie	*Pteris parhamii* Brownlie	Pteridaceae
Pteris tremula R.Br.	*Pteris tremula* R.Br.	Pteridaceae
Pteris tripartita Sw.	*Pteris tripartita* Sw.	Pteridaceae
Pteris vitiensis Baker	*Pteris vitiensis* Baker	Pteridaceae
Pteris vittata L.	*Pteris vittata* L.	Pteridaceae
Pyrrosia adnascens (Sw.) Ching	*Pyrrosia lanceolata* (L.) Farw.	Polypodiaceae
Pyrrosia blepharolepis (C.Chr.) Ching	*Pyrrosia serpens* (G.Forst.) Ching	Polypodiaceae
Salvinia auriculata Aubl.	*Salvinia molesta* D.S.Mitch.	Salviniaceae

Schizaea dichotoma (L.) Sm.	*Schizaea dichotoma* (L.) Sm.	Schizaeaceae
Schizaea fistulosa Labill.	*Schizaea fistulosa* Labill.	Schizaeaceae
Schizaea melanesica Selling	*Schizaea melanesica* Selling	Schizaeaceae
Scyphularia pycnocarpa (Brack.) Copel.	*Davallia pentaphylla* Blume	Davalliaceae
Selaginella breynioides Baker	*Selaginella breynioides* Baker	Selaginellaceae
Selaginella distans Warb.	*Selaginella distans* Warb.	Selaginellaceae
Selaginella firmula A.Braun ex Kuhn	*Selaginella firmula* A.Braun ex Kuhn	Selaginellaceae
Selaginella laxa Spring	*Selaginella laxa* Spring	Selaginellaceae
Selaginella rechingeri Hieron. ex Rech.	*Selaginella rechingeri* Hieron. ex Rech.	Selaginellaceae
Selaginella victoriae T.Moore	*Selaginella victoriae* T.Moore	Selaginellaceae
Selaginella viridangula Spring	*Selaginella viridangula* Spring	Selaginellaceae
Selliguea feeoides Copel.	*Selliguea feeioides* Copel.	Polypodiaceae
Sphaerostephanos invisus (G.Forst.) Holttum	*Sphaerostephanos invisus* (G.Forst.) Holttum	Thelypteridaceae
Sphaerostephanos unitus (L.) Holttum	*Sphaerostephanos unitus* (L.) Holttum	Thelypteridaceae
Sphenomeris chinensis (L.) Maxon	*Odontosoria chinensis* (L.) J.Sm.	Lindsaeaceae
Stenochlaena palustris (Burm.f.) Bedd.	*Stenochlaena palustris* (Burm.f.) Bedd.	Blechnaceae
Syngramma borneensis (Hook.) J.Sm.	*Syngramma borneensis* (Hook.) J.Sm.	Pteridaceae
Syngramma spathulata (C.Chr.) Holttum	*Syngramma spathulata* (C.Chr.) Holttum	Pteridaceae
Taenitis hookeri (C.Chr.) Holttum	*Taenitis hookeri* (C.Chr.) Holttum	Pteridaceae
Taenitis pinnata (J.Sm.) Holttum var. *brachysora* (Baker) Holttum	*Taenitis pinnata* (J.Sm.) Holttum var. *brachysora* (Baker) Holttum	Pteridaceae
Taenitis pinnata (J.Sm.) Holttum var. *pinnata*	*Taenitis pinnata* (J.Sm.) Holttum var. *pinnata*	Pteridaceae
Taenitis pinnata (J.Sm.) Holttum var. *polypodioides* (Baker) Holttum	*Taenitis pinnata* (J.Sm.) Holttum var. *polypodioides* (Baker) Holttum	Pteridaceae
Tapeinidium denhamii (Hook.) C.Chr.	*Tapeinidium denhamii* (Hook.) C.Chr.	Lindsaeaceae

Name used in Brownlie (1977)	Currently accepted name	Current family
Tapeinidium melanesicum K.U.Kramer	*Tapeinidium melanesicum* K.U.Kramer	Lindsaeaceae
Tectaria crenata Cav.	*Tectaria crenata* Cav.	Tectariaceae
Tectaria decurrens (C.Presl) Copel.	*Tectaria decurrens* (C.Presl) Copel.	Tectariaceae
Tectaria degeneri Copel.	*Tectaria degeneri* Copel.	Tectariaceae
Tectaria dissecta (G.Forst.) Lellinger	*Tectaria dissecta* (G.Forst.) Lellinger	Tectariaceae
Tectaria godeffroyi (Luerss.) Copel.	*Tectaria godeffroyi* (Luerss.) Copel.	Tectariaceae
Tectaria hookerii Brownlie	*Tectaria hookeri* Brownlie	Tectariaceae
Tectaria latifolia (G.Forst.) Copel.	*Tectaria latifolia* (G.Forst.) Copel.	Tectariaceae
Tectaria menyanthidis (C.Presl) Copel.	*Tectaria menyanthidis* (C.Presl) Copel.	Tectariaceae
Tectaria nausoriensis Brownlie	*Tectaria nausoriensis* Brownlie	Tectariaceae
Tectaria tripartita (Baker) Copel.	*Tectaria tripartita* (Baker) Copel.	Tectariaceae
Tectaria vitiensis Brownlie	*Tectaria vitiensis* Brownlie	Tectariaceae
Tmesipteris truncata (R.Br.) Desv.	*Tmesipteris truncata* (R.Br.) Desv.	Psilotaceae
Trichomanes aphlebioides H.Christ	*Trichomanes aphlebioides* H.Christ	Hymenophyllaceae
Trichomanes apiifolium C.Presl	*Trichomanes apiifolium* C.Presl	Hymenophyllaceae
Trichomanes asae-grayi Bosch	*Trichomanes asae-grayi* Bosch	Hymenophyllaceae
Trichomanes bimarginatum Bosch	*Trichomanes bimarginatum* Bosch	Hymenophyllaceae
Trichomanes bipunctatum Poir.	*Trichomanes bipunctatum* Poir.	Hymenophyllaceae
Trichomanes boryanum Kunze	*Trichomanes atrovirens* (C.Presl) Kunze	Hymenophyllaceae
Trichomanes caespifrons C.Chr.	*Trichomanes caespifrons* C.Chr.	Hymenophyllaceae
Trichomanes caudatum Brack.	*Trichomanes caudatum* Brack.	Hymenophyllaceae

Trichomanes cultratum Baker	*Trichomanes motleyi* Bosch	Hymenophyllaceae
Trichomanes dentatum Bosch	*Trichomanes dentatum* Bosch	Hymenophyllaceae
Trichomanes endlicherianum C.Presl	*Trichomanes endlicherianum* C.Presl	Hymenophyllaceae
Trichomanes humile G.Forst.	*Trichomanes humile* G.Forst.	Hymenophyllaceae
Trichomanes intermedium Bosch	*Trichomanes intermedium* Bosch	Hymenophyllaceae
Trichomanes maximum Blume	*Trichomanes maximum* Blume	Hymenophyllaceae
Trichomanes saxifragoides C.Presl	*Trichomanes minutum* Blume	Hymenophyllaceae
Trichomanes tahitense Nadeaud	*Trichomanes tahitense* Nadeaud	Hymenophyllaceae
Trichomanes tomaiiviense Brownlie	*Hymenophyllum tomaniiviense* (Brownlie) Ebihara et K.Iwats.	Hymenophyllaceae
Trichomanes vitiense Baker	*Trichomanes vitiense* Baker	Hymenophyllaceae
Vaginularia angustissima (Brack.) Mett.	*Monogramma paradoxa* (Fée) Bedd.	Pteridaceae
Vittaria elongata Sw.	*Vittaria elongata* Sw.	Pteridaceae
Vittaria scolopendrina (Bory) Thwaites	*Vittaria scolopendrina* (Bory) Thwaites	Pteridaceae

Appendix 2. Index of new records since Brownlie (1977) ctd.

Reference	Currently accepted name	Current family
Parris (1994)	*Acrostichum speciosum* Willd.	Pteridaceae
NMNS (2008) but without citing a specimen	*Adiantum capillus-veneris* L.	Pteridaceae
NMNS (2008) but without citing a specimen	*Adiantum trapeziforme* L.	Pteridaceae
NMNS (2008)	*Arthropteris beckleri* (Hook.) Mett.	Tectariaceae
Parris (1994)	*Asplenium lobulatum* Mett. ex Kuhn	Aspleniaceae
Hovenkamp & Franken (1993)	*Belvisia spicata* (L.f.) Mirb. ex Copel.	Polypodiaceae
NMNS (2008)	*Chingia* aff. *imponens* (Ces.) Holttum	Thelypteridaceae
Parris (1994)	*Chingia longissima* (Brack.) Holttum	Thelypteridaceae
Holttum (1985)	*Ctenitis subglandulosa* (Hance) Ching	Dryopteridaceae
NMNS (2008) but without citing a specimen	*Davallia plumosa* Baker	Davalliaceae
NMNS (2008)	*Deparia japonica* (Thunb.) M.Kato	Woodsiaceae
NMNS (2008)	*Dicranopteris curranii* Copel.	Gleicheniaceae
NMNS (2008) but without citing a specimen	*Doodia media* R.Br.	Blechnaceae
NMNS (2008)	*Goniophlebium persicifolium* (Desv.) Bedd.	Polypodiaceae
Parris (1983)	*Oreogrammitis adspersa* (Blume) Parris (as *Grammitis adspersa* (Blume) Blume)	Polypodiaceae
NMNS (2008) but without citing a specimen	*Huperzia phlegmarioides* (Gaud.) Rothm.	Lycopodiaceae
NMNS (2008)	*Huperzia* sp. 1	Lycopodiaceae
Ebihara & Iwatsuki (2007)	*Hymenophyllum macgillivrayi* (Baker) Copel.	Hymenophyllaceae
Ebihara & Iwatsuki (2007) but without citing a specimen	*Hymenophyllum multifidum* (G.Forst.) Sw.	Hymenophyllaceae
NMNS (2008) but without citing a specimen	*Hymenophyllum pallidum* (Blume) Ebihara et K.Iwats.	Hymenophyllaceae
Ebihara & Iwatsuki (2007) but without citing a specimen	*Hymenophyllum serrulatum* (C.Presl) C.Chr.	Hymenophyllaceae

NMNS (2008) but without citing a specimen	*Lygodium microphyllum* (Cav.) R.Br.	Lygodiaceae
Hovenkamp & Miyamoto (2005)	*Nephrolepis brownii* (Desv.) Hovenkamp et Miyam.	Lomariopsidaceae
NMNS (2008)	*Oleandra whitmeei* Baker	Oleandraceae
NMNS (2008)	*Oleandra* sp.1	Oleandraceae
NMNS (2008)	*Pityrogramma calomelanos* (L.) Link	Pteridaceae
Parris (1994)	*Pseudophegopteris paludosa* (Blume) Ching	Thelypteridaceae
Parris (1994)	*Pteris milneana* (Hook.) Baker	Pteridaceae
NMNS (2008)	*Pteris multifida* Poir.	Pteridaceae

Appendix 3. Synonyms and other names referred to in text

Cited name	Referred to under currently accepted name	Current family
Abrodictyum asae-grayi (Bosch) Ebihara et K.Iwats.	*Trichomanes asae-grayi* Bosch	Hymenophyllaceae
Abrodictyum caudatum (Brack.) Ebihara et K.Iwats.	*Trichomanes caudatum* Brack.	Hymenophyllaceae
Abrodictyum dentatum (Bosch) Ebihara et K.Iwats.	*Trichomanes dentatum* Bosch	Hymenophyllaceae
Adiantum lunulatum Burm.f.	*Adiantum philippense* L.	Pteridaceae
Adiantum tenerum Sw.	*Adiantum capillus-veneris* L.	Pteridaceae
Alsophila alta (Copel.) R.M.Tryon	*Cyathea alta* Copel.	Cyatheaceae
Alsophila plagiostegia (Copel.) R.M.Tryon	*Cyathea plagiostegia* Copel.	Cyatheaceae
Alsophila tahitensis Brack.	*Cyathea affinis* (G.Forst.) Sw.	Cyatheaceae
Angiopteris evecta (G.Forst.) Hoffm. var. *vaupelli* Hieron.	*Angiopteris evecta* (G.Forst.) Hoffm.	Marattiaceae
Antrophyum callifolium Blume	*Antrophyum alatum* Brack.	Pteridaceae
Arthropteris palisotii (Desv.) Alston	*Arthropteris repens* (Brack.) C.Chr.	Tectariaceae
Asplenium neolaserpitiifolium Tardieu et Ching	*Asplenium laserpitiifolium* Lam.	Aspleniaceae
Asplenium oligolepidum C.Chr.	*Asplenium carruthersii* Baker	Aspleniaceae
Asplenium powellii Baker	*Asplenium stenolobum* C.Chr.	Aspleniaceae
Asplenium pseudolaserpitiifolium Tardieu et Ching	*Asplenium laserpitiifolium* Lam.	Aspleniaceae
Blechnum norfolkianum (Heward) C.Chr.	*Blechnum chambersii* Tindale	Blechnaceae
Blechnum vulcanicum (Blume) Kuhn	*Blechnum pilosum* (Brack.) Brownlie	Blechnaceae
Bolbitis quoyana (Gaudich.) Ching	*Bolbitis vanuaensis* Brownlie	Dryopteridaceae
Callistopteris apiifolia (C.Presl) Copel.	*Trichomanes apiifolium* C.Presl	Hymenophyllaceae
Calochlaena dubia (R.Br.) M.D.Turner et R.A.White	*Calochlaena* (Maxon) M.D.Turner et R.A.White	Dicksoniaceae
Cephalomanes atrovirens C.Presl	*Trichomanes atrovirens* (C.Presl) Kunze	Hymenophyllaceae
Crepidomanes aphlebioides (H.Christ) I.M.Turner	*Trichomanes aphlebioides* H.Christ	Hymenophyllaceae

Crepidomanes bipunctatum (Poir.) Copel.	*Trichomanes bipunctatum* Poir.	Hymenophyllaceae
Crepidomanes humile (G.Forst.) Bosch	*Trichomanes humile* G.Forst.	Hymenophyllaceae
Crepidomanes intermedium (Bosch) Ebihara et. K.Iwats.	*Trichomanes intermedium* Bosch	Hymenophyllaceae
Crepidomanes minutum (Blume) K.Iwats.	*Trichomanes minutum* Blume	Hymenophyllaceae
Crepidomanes vitiense (Baker) Bostock	*Trichomanes vitiense* Baker	Hymenophyllaceae
Culcita blepharodes Maxon	*Calochlaena* (Maxon) M.D. Turner et R.A.White	Dicksoniaceae
Davallia denticulata (Burm.f.) Mett. ex Kuhn	*Wibelia epiphylla* (G.Forst.) M.Kato et Tsutsumi	Davalliaceae
Davallia pycnocarpa Brack.	*Davallia pentaphylla* Blume	Davalliaceae
Davallia repens (L.f.) Kuhn	*Davallia botrychioides* (Brack.) Baker	Davalliaceae
Didymoglossum bimarginatum (Bosch) Ebihara et K.Iwats.	*Trichomanes bimarginatum* Bosch	Hymenophyllaceae
Didymoglossum motleyi (Bosch) Ebihara et K.Iwats.	*Trichomanes motleyi* Bosch	Hymenophyllaceae
Didymoglossum tahitense (Nadeaud) Ebihara et K.Iwats	*Trichomanes tahitense* Nadeaud	Hymenophyllaceae
Diplazium dameriae Pic.Serm.	*Diplazium bulbiferum* Brack.	Woodsiaceae
Dryopteris arborescens (Baker) Kuntze	*Arachniodes maxima* (Baker) Brownlie	Dryopteridaceae
Goniophlebium subauriculatum (Blume) C.Presl	*Goniophlebium serratifolium* Brack.	Polypodiaceae
Grammitis adspersa (Blume) Blume	*Oreogrammitis adspersa* (Blume) Parris	Polypodiaceae
Grammitis alta Parris	*Oreogrammitis alta* (Parris) Parris	Polypodiaceae
Gymnosphaera hornei (Baker) Copel.	*Cyathea hornei* (Baker) Copel.	Hymenophyllaceae
Histiopteris herbacea Copel.	*Histiopteris sinuata* (Brack.) J.Sm.	Dennstaedtiaceae
Histiopteris integrifolia Copel.	*Histiopteris sinuata* (Brack.) J.Sm.	Dennstaedtiaceae
Histiopteris stipulacea (Hook.) Copel.	*Histiopteris sinuata* (Brack.) J.Sm.	Dennstaedtiaceae
Humata repens (L.f.) Kuhn	*Davallia botrychioides* (Brack.) Baker	Davalliaceae
Humata sessilifolia (Blume) Mett.	*Davallia sessilifolia* Blume	Davalliaceae
Huperzia dalhousieana (Spring) Trevis.	*Huperzia magnifica* (Brownlie) Holub	Lycopodiaceae
Hymenophyllum meyenianum (C.Presl) Copel.	*Hymenophyllum serrulatum* (C.Presl) C.Chr.	Hymenophyllaceae

Hymenophyllum samoense Baker	Hymenophyllaceae
Lindsaea sessilis Copel.	Lindsaeaceae
Nephrolepis cordifolia var. *pseudolauterbachii* Hovenkamp et Miyam.	Lomariopsidaceae
Phymatosorus commutatus (Blume) Pic.Serm.	Polypodiaceae
Phymatosorus membranifolius (R.Br.) S.G.Lu	Polypodiaceae
Plesioneuron attenuatum (Brack.) Holttum	Thelypteridaceae
Pneumatopteris transversaria (Brack.) Holttum	Thelypteridaceae
Polyphlebium endlicherianum (C.Presl) Ebihara et K.Iwats.	Hymenophyllaceae
Polystichum moluccense (Blume) T.Moore	Dryopteridaceae
Pronephrium asperum (C.Presl) Holttum	Thelypteridaceae
Pseudophegopteris fijiensis Kramer et Zogg	Thelypteridaceae
Pseudophegopteris persimilis (Baker) Holttum	Thelypteridaceae
Pteris werneri (Rosenst.) Holttum	Pteridaceae
Selaginella ciliaris (Retz) Spring	Selaginellaceae
Selaginella hordeiformis Baker	Selaginellaceae
Sphaeropteris lunulata (G.Forst.) R.M.Tryon	Cyatheaceae
Sphaeropteris medullaris (G.Forst.) Bernh.	Cyatheaceae
Sphaeropteris microlepidota (Copel.) R.M.Tryon	Cyatheaceae
Sphaeropteris propinqua (Mett.) R.M.Tryon	Cyatheaceae
Sphaeropteris subsessilis (Copel.) R.M.Tryon	Cyatheaceae
Sphaeropteris truncata (Brack.) R.M.Tryon	Cyatheaceae
Taenitis blechnoides (Willd.) Sw.	Pteridaceae
Tmesipteris oblanceolata Copel.	Psilotaceae
Trichomanes obscurum Blume	Hymenophyllaceae
Vandenboschia maxima (Blume) Copel.	Hymenophyllaceae
Hymenophyllum javanicum Spreng.	
Lindsaea repens var. *sessilis* (Copel.) K.U.Kramer	
Nephrolepis flexuousa Colenso	
Microsorum commutatum (Blume) Copel.	
Microsorum membranifolium (R.Br.) Ching	
Plesioneuron (Holttum) Holttum	
Pneumatopteris magnifica (Copel.) Holttum	
Trichomanes endlicherianum C.Presl	
Polystichum aff. *moluccense* (Blume) T.Moore	
Pronephrium C.Presl	
Pseudophegopteris paludosa (Blume) Ching	
Pseudophegopteris paludosa (Blume) Ching	
Pteris parhamii Brownlie	
Selaginella laxa Spring	
Selaginella P.Beauv.	
Cyathea lunulata (G.Forst.) Copel.	
Cyathea medullaris (G.Forst.) Sw.	
Cyathea microlepidota Copel.	
Cyathea propinqua Mett.	
Cyathea subsessilis Copel.	
Cyathea truncata (Brack.) Copel.	
Taenitis Willd. ex Schkuhr	
Tmesipteris truncata (R.Br.) Desv.	
Trichomanes dentatum Bosch	
Trichomanes maximum Blume	

Telopea 13(3) 563–576

New records, range extensions and descriptions for some unfamiliar Australian Lejeuneaceae (Jungermanniopsida)

Matt A.M. Renner

National Herbarium of New South Wales, Mrs Macquaries Road, Sydney, NSW 2000.

Abstract

Cololejeunea triapiculata is newly recorded for Australia from epiphyllous material collected on Mt Bartle Frere. Additional collections, descriptions and illustrations, are provided for *Cololejeunea haskarliana* and *Lepidolejeunea integristipula*, two other species recently reported from Australia. A further three species, *Cheilolejeunea ventricosa*, *Lejeunea bischlerae* and *L. sordida*, are reported new for New South Wales. Finally, the name *Cololejeunea planissima* replaces *C. aoshimensis*, as it is the correct name for Australian material previously identified as *C. aoshimensis*.

Introduction

Australia has a large and diverse liverwort flora, with 869 accepted species and infraspecific liverwort and hornwort taxa listed by McCarthy (2003), nearly 20% of which belong to the Lejeuneaceae, the largest family of leafy liverwort (Schuster 1963). Knowledge of Australian Lejeuneaceae has been improved in recent years by a number of investigators including Grolle (1982) who reviewed the family in Tasmania, Thiers & Gradstein (1989) who revised Lejeuneaceae subf. Ptychanthoideae for Australia, and Thiers (1988) who revised *Cololejeunea* for Australia. However, new records continue to increase the size of the Australian Lejeuneaceae flora, particularly *Cololejeunea*. Several *Aphanolejeunea* species, now all transferred to *Cololejeunea* (Pócs & Bernecker 2009), were reported by Pócs & Streimann (1999) from Queensland, Zhu & Lai (2005) recorded two *Cheilolejeunea* species new for Australia, and Pócs & Streimann (2006) reported ten new Lejeuneaceae, including three *Cololejeunea* species, for Australia. Here I report another *Cololejeunea* species new to Australia and provide additional distributional Australian records for some other species. The Australian record of *C. aoshimensis* is confirmed and updated, by replacement with the name *C. planissima*. The additional taxon reported here brings the number of *Cololejeunea* species known from Australia to 36 (including *Aphanolejeunea*). Descriptions and illustrations are here provided, as well as additional localities for some other unfamiliar Lejeuneaceae, newly recorded for Australia in recent years.

© 2011 Royal Botanic Gardens and Domain Trust ISSN0312-9764

Cheilolejeunea ventricosa (Schiffn.) X.-L.He, Acta Bot. Fenn. 163: 60. 1999.

Basionym: *Pycnolejeunea ventricosa* Schiffn., Consp. Hepat. Arch. Ind.: 261. 1898.

Type: Indonesia: Maluku: Moluccas Is. [Pulau Ambon], Amboina [Ambon], 1875, *Naumann s.n.* (FH).

Description: Zhu & Lai (2005).

Illustration: Zhu & Lai (2005).

Specimens examined: Australia, New South Wales, North Coast, Mt Warning National Park, Mt Warning summit track, 900 m, 28°24'S 153°16'E, 17 June 2005, *M.A.M. Renner 1430c & E.A.Brown*, NSW865956.

Distribution and habitats: *Cheilolejeunea ventricosa* is known from Mauritius, China, Malaysia, Singapore, Indonesia, Papua New Guinea, and Queensland, Australia. The first Australian record was based on a single collection made by Ilma Stone from Kennedy National Park in June 1984, and was mixed with *Schiffnerolejeunea tumida* var. *haskarliana*. Unfortunately no detailed habitat information was available. Pócs & Streimann (2006) reported additional collections and localities for Queensland. *Cheilolejeunea ventricosa* is here reported new for New South Wales, from Mt Warning where it grew on bark sloughing from fallen branches hanging above the forest floor beneath a broken canopy. Presumably *C. ventricosa* had established as a branch epiphyte in the canopy of the low stature forest that grows on the flanks of Mt Warning. *Cheilolejeunea ventricosa* co-occurred with *Drepanolejeunea* sp., *Frullania* spp., and *Mastigolejeunea calcarata*.

Recognition: *Cheilolejeunea ventricosa* can be recognised by: 1) the strongly inflated leaf lobules which are; 2) two thirds as long as the leaf lobes with; 3) an evenly curved keel; and 4) the lobule arch fused with leaf lobe across 2–5 leaf cells; and 5) the suborbicular leaves that are 6) strongly convex.

Cololejeunea haskarliana (Gotts.) Benedix, Feddes Repert. 134: 57. 1953.

Basionym: *Lejeunea haskarliana* Lehm. et Lindenb., Novarum et Minus Cognitarum Stirpium Pugillus 8: 26. 1844.

Type: Indonesia: Java: "Habitat in Java insula, ubi in aliis Jungermaniis repentem. Legit cl. Haskarl". Type material not located.

Description: [from Australian material] forming extensive diffuse green networks of radiating shoots on leaves. Shoots green when fresh, fading to brown in herbaria, medium sized for genus, to 13 mm long and 0.8 mm wide, branching frequent but irregular, shoot system monomorphic, lateral branches similar in stature to parent branch. Stems with internal walls slightly thickened and with triangular trigones of primary wall at cell wall junctions, five cortical cells, one ventral cell row and one medulla cell roughly the same size as the larger cortical cells. Rhizoids derived from ventral cortical cell, always in groups of eight arranged in two rows of four. Dorsal leaf-free strip absent. Branching *Lejeunea*-type, collar a shredded ring 1 or 2 cells high continuous around branch base, persistent. Lobes obovate, 330–470 µm long and 200–290 µm wide, erect when moist and dry, contiguous, stem partially obscured by lobes in dorsal view; apex rounded, flush at acroscopic base; margins spinulose due to sharply papillose cells, except for base of acroscopic margin which is entire. Cells of lobe surface sharply papillose, lobe cell surfaces unornamented. Lobules always normally developed,

no explanate morphs seen in Australian material; one tenth the lobe area, 115–240 µm long and 76–110 µm wide, ovate carinal region inflated, pyriform, cells smooth, keel gently arched through 45–50°, cells smooth at base but papillose in outer half; antical margin arched, base obscured by carinal region, outer third usually visible; with two teeth, the first tooth unicellular, apex rounded, cell elongate, pointing toward shoot apex; first tooth overlapping second tooth; second tooth unicellular, cell triangular, apex acute, more or less perpendicular to first tooth, mostly obscured by first tooth in ventral view, though apex usually projects beyond side of first tooth; papilla absent from all mature lobules examined, in immature lobules affixed to the inner surface first tooth cell at its base, possibly dislodged as second tooth grows behind first tooth, as second tooth is absent from juvenile lobules. Stylus present on young lobules, filiform, 2-celled, deciduous. Medial lobule cells quadrate to rectangular, becoming progressively larger and more elongate from lobe margin to lobe base, basal cells subocellate, forming an indiscrete cluster in lobe base, cell walls straight, triangular trigones present, medial wall thickenings absent. Asexual reproduction by substellate 20-celled gemmae; bilaterally symmetrical, pentagonal, with obtuse cells at points of pentagon, and typically three initial-cells that have conspicuously bulging cell lumens, one above each of the lateral point cells and one between the ventral point cells; produced from ventral lobe surface, occasionally in abundance. Dioicous (?). Males not seen. Gynoecia subtended by a single *Radula*-type innovation with rhizoid field then leaf. Female bracts in one pair, symmetrical, bracts 320–370 µm long and 150–190 µm wide at widest point, obovate, plane, margins spinulose, lobules 190–240 µm long and 150–170 µm wide, oblong, margins dentate. Perianths dorso-ventrally compressed, trapeziform in transverse section, becoming plano-convex as sporophyte grows, 420–470 µm long and 230–260 µm wide, trapeziform in transverse section, dorsal carina lacking, lateral and ventral carinae prominent, both retained as sporophyte grows and pushes outward on ventral face of perianth, upper perianth cells on all faces and all carinae sharply papillose, basal perianth cells smooth, rectangular, leptodermous; rostrum short, less than one cell tier high. Sporophytes not known in Australia.

Specimens examined: Australia, Queensland, Cook District, Wooroonooran National Park, Mt Bartle Frere, vicinity of northern summit, 15 July 2005, *M.A.M. Renner 2266 & E.A. Brown*, NSW867281.

Distribution and habitats: known from Cambodia, Vietnam, Malaysia, Indonesia (Java) and New Caledonia (Tixier 1985). In Australia *C. haskarliana* is known from three locations in the Wet Tropics Bioregion: Mossmann Gorge, the Mt Finlayson Range and Mt Bartle Frere. On Mt Bartle Frere, *C. haskarliana* grew as an epiphyll on *Blechnum* sp. *Cololejeunea haskarliana* exhibits broad altitudinal tolerance in Australia, and is known to occur between 110 and 1500 m elevation.

Recognition: *Cololejeunea haskarliana* can be recognised by: 1) cells of lobe surface and margin armed with spinulose papillae; 2) erecto-patent leaves standing away from substrate; 3) first lobule tooth overlapping and obscuring the second lobule tooth, which 4) points sideways and is perpendicular to the first lobule tooth; 5) lobule keel with spinulose papillae at outer end; 6) pentagonal 20-celled gemmae produced from underside of leaf lobe; 7) spinulose margins of female bract lobules; 8) box-shaped perianths lacking evidence of a dorsal carina and having 9) spinulose-papillose perianth walls; 10) stems with a single medulla cell row and five cortical cell rows (Fig. 1).

Remarks: *Cololejeunea haskarliana* was first reported for Australia by Pócs & Streimann (2006) from Mossman Gorge and the Mt Finlayson Range between 110 m and 310 m altitude.

Cololejeunea triapiculata (Herzog) Tixier, Gard. Bull. Singapore 25: 344. 1971.

Basionym: *Leptocolea triapiculata* Herzog, Ann. Bryol. 5: 95. 1932.

Type: Asia, Indonesia, Sumatra "Fort de Kock (leg. *K. v. Goebel, n.17c...*)". Type material not located.

Description: [from Australian material] forming pale green patches of radiating shoots on leaves. Shoots pale green when fresh, fading in herbaria, large for genus, to 19 mm long and 2 mm wide, branching infrequent and irregular, shoot system monomorphic, lateral branches similar in stature to parent branch. Stems with external and internal walls unthickened except for triangular trigones of primary wall at cell wall junctions, seven cortical cells, the three ventral cells smaller than others, and one medulla cell roughly the same size as the larger cortical cells. Dorsal leaf-free strip absent. Branching *Lejeunea*-type, collar a discontinuous ring 1 or 2 cells high, apparently deciduous, leaving branches appearing collarless. Lobes oblong, 640–900 µm long and 560–840 µm wide, closely adpressed to substrate on younger shoot sectors when moist, orientation unchanged when dry, on older shoot sectors lobes disrupted and elevated by perianths, imbricate, stem obscured by lobes in dorsal view; apex broadly rounded, minutely auriculate at acroscopic base; margins irregularly crenulate due to collapsed cell walls, lobes bordered by 2 or 3 tiers of elongate, colourless cells. Cells of lobe surface not papillose or mamillose, dorsal lobe cell surfaces punctulate, ventral lobe cell surfaces smooth. Lobules always normally developed, no explanate morphs seen in Australian material; one tenth the lobe area, 250–440 µm long and 200–280 µm wide, obrhombiform with truncate apex, more or less flat, carinal region weakly inflated, keel arched evenly through 90–135°, smooth, without mamillose or papillose cells; antical margin straight, mostly visible though mid portions may be weakly inrolled; with three teeth, the zeroth and second teeth typically claw-like, comprised of 1 or 2 cells on a 2-celled base; first tooth unicellular atop one tier of projecting lobule cells, either 1 or 2 cells wide; lobule papilla attached to the lobule margin at the junction between the projecting lobule cell and the tooth cell, and may be partially fused with the margin of the tooth cell, imparting an anvil-like appearance to the first lobule tooth; in small lobules the zeroth lobule tooth may be absent. Medial lobule cells elongate, with sinuous cell walls. Asexual reproduction absent. Autoicous. Androecia on lateral branches that may continue vegetative growth, androecial bracts imbricate, lobules epistatic, 210–240 µm long and 115–130 µm wide, the antical margin strongly inrolled behind next youngest bract, each containing a single antheridium. Gynoecia subtended by a single *Radula*-type innovation with rhizoid field then leaf. Female bracts in one pair, symmetrical 800–920 µm long and 460–740 µm wide at widest point, obovate, plane, with border of 2 or 3 tiers of elongate hyaline cells, lobules 400–530 µm long and 150–180 µm wide oblong, margins dentate. Perianths dorso-ventrally compressed, box-shaped at first, becoming plano-convex as sporophyte grows, 980–1060 µm long and 600–640 µm wide, trapeziform in transverse section, dorsal carina lacking, lateral carinae prominent, ventral carinae faint, lost as sporophyte grows and pushes outward on ventral face of perianth, carinae unarmed; perianth cells smooth. Rostrum short, less than one cell tier high. Sporophytes not known in Australia.

Specimens examined: Australia, Queensland, Cook, Wooroonooran National Park, Mt Bartle Frere, 15 July 2005, *M.A.M. Renner 2267 & E.A. Brown,* NSW867282; *M.A.M. Renner 2268 & E.A. Brown,* NSW867283.

Distribution and habitats: known from Sri Lanka, Malaysia, Indonesia (Sumatra and Java) (Tixier 1985) and from Réunion, the Seychelles, Bhutan, Southern China, Cambodia and the Philippines (Zhu & So 2001). New to Australia, where known from a single locality within the Wet Tropics Bioregion of north-eastern Queensland, growing in complex notophyll vine forest as an epiphyll on leaves of rainforest trees and shrubs in and around a small dry gully. *Cololejeunea triapiculata* co-occurred with *Cololejeunea ocelloides*, *Cololejeunea veillonii*, *Colura* sp., *Cheilolejeunea* subg. *Xenolejeunea* spp., *Drepanolejeunea* spp. *Leptolejeunea* sp., and *Strigula* sp.

Recognition: *Cololejeunea triapiculata* can be recognised by the combination of: 1) 2 or 3 tiers of hyaline thin-walled cells bordering leaf lobes; 2) punctulate ornamentation on dorsal surface of leaf lobe cells; 3) the obrhombiform lobules; bearing 4) three lobule teeth; with 5) first tooth unicellular atop a single tier of projecting lobule cells, either 1 or 2 cells wide; 6) the lobule papilla attached to the lobule margin at the junction between the projecting lobule cell and the tooth cell, sometimes partially fused with the margin of the tooth cell, imparting an anvil-like appearance to the first lobule tooth; 7) the zeroth and second lobule teeth typically claw-like, comprising 1 or 2 cells on a 2-celled base; 8) dorso-ventrally compressed perianths bearing four carinae, box-shaped when young, becoming plano-convex as sporophyte matures and thus obscuring the two ventral carinae; 9) the relatively large size of the plants (Fig. 2).

Remarks: *Cololejeunea inflata* Steph., as *Cololejeunea oshimensis* (Horik.) Benedix, was reported by Meagher (2003) from Mt Lewis, Queensland, but the record was not vouchered as there was "insufficient material". *Cololejeunea triapiculata* is similar in many respects to *C. inflata*, and the record of *C. oshimensis* could be based on a misidentification of a sporeling or other depauperate material of *C. triapiculata*. The two species share 1) a leaf lobe border of hyaline, thin-walled, cells, 2) a truncate lobule apex, 3) a claw-like second lobule tooth, and 4) a prominent first lobule tooth. Technical differences associated with the number of lobule teeth, which may be variably expressed in young specimens; the position of the hyaline papilla, which may be shed from mature lobules; and the nature of lobe cell surface ornamentation, may be overlooked — any of these factors could have contributed to confusion between these two species.

Lejeunea bischlerae B.Thiers, Cryptogamie Bryologie Lichenologie 18: 223. 1997.

Type: Australia, Queensland, Yungaburra, Gillies Road, near Mt Nomico, 8 Sept. 1985, *G.A.M. Scott s.n.* (holotype: MUCV6939, isotype: NY)

Description: Thiers (1997).

Illustration: Thiers (1997).

Specimens examined: Australia, New South Wales, North Coast, Border Ranges National Park, Tweed Ranges Road, unnamed lookout, 725 m, 28°27'S 153°0'E, 19 June 2005, *M.A.M. Renner 1500b & E.A. Brown,* NSW866036.

Distribution and habitats: known only from Australia, originally described from its above given holotype locality in Queensland and from a paratype also collected by Scott at Millaa Millaa, Zillies Falls Rd., 6 Sept. 1985 (MUCV 7068). New to New South Wales where known from two localities, one in the Border Ranges National Park,

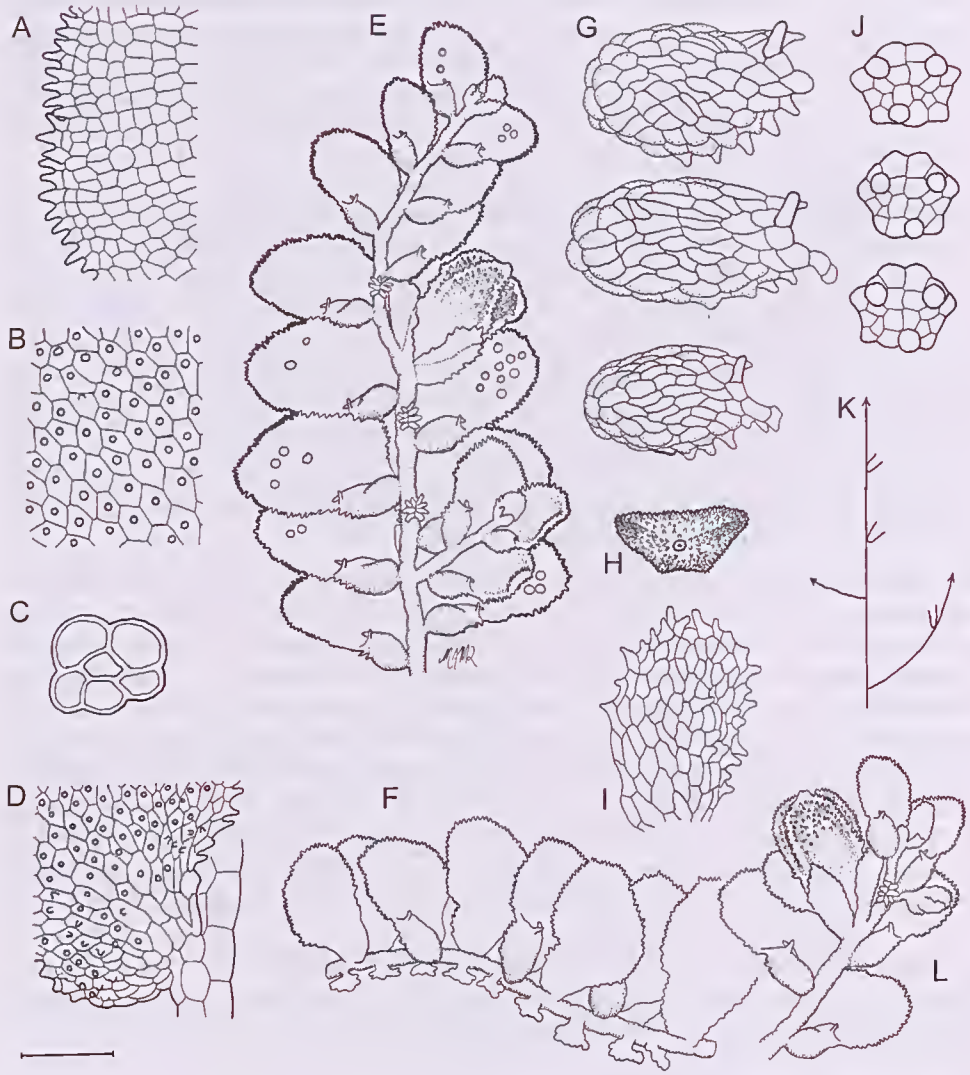

Fig. 1. *Cololejeunea haskarliana* A, lobe marginal cells, mammillae indicated at margin only. B, lobe medial cells. C, stem transverse section. D, acroscopic leaf lobe base. E, shoot, ventral view. F, shoot, lateral view. G, lobule. H, perianth end view. I, apex of female bract lobule. J, gemmae. K, cladogram, L, fertile shoot. All from NSW867281. Scale bar: A–D, I, J = 45 mm; E–H, L = 240 mm; G = 30 mm.

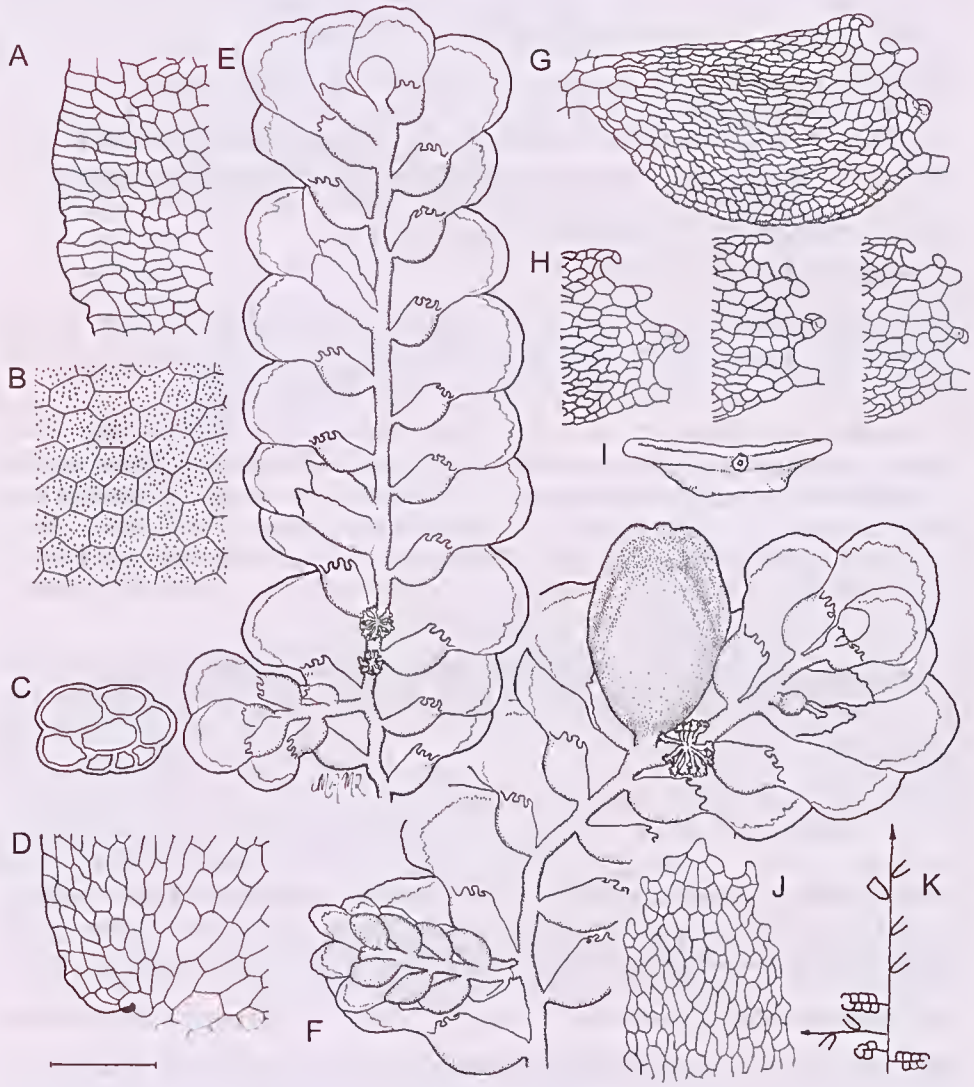

Fig. 2. *Cololejeunea triapiculata* **A,** lobe marginal cells. **B,** lobe medial cells. **C,** stem transverse section. **D,** acroscopic leaf lobe base. **E,** shoot, ventral view. **F,** lobule. **G,** lobule apices. **H,** perianth end view. **I,** autoicous shoot ventral view. **J,** apex of female bract lobule. **K,** cladogram. All from NSW867283. Scale bar: A–C, G, H, J = 50 mm; D = 45 mm; E, F, I = 240 mm.

the other within Mt Warning National Park (see *L. sordida*, below). In both locations *L. bischlerae* grew corticolous on mid-branches of subcanopy trees adjacent gaps in cloud forest. Species growing with *L. bischlerae* include *Cheilolejeunea* spp., *Cololejeunea floccosa*, *Lejeunea sordida*, *Lejeunea* spp. and *Leptolejeunea subacuta*.

Recognition: *Lejeunea bischlerae* can be recognised by: 1) the granular ornamentation on the dorsal and ventral lobe cell surfaces (more pronounced on dorsal surface), 2) small size, shoots c. 500 µm diameter, 3) relatively large lobule, c. 0.6 lobe area, 4) small, rotund underleaves scarcely wider than the stem.

Lejeunea sordida (Nees) Mont., Ann. Sci. Nat. Bot., ser. 2, 3: 211. 1835

Basionym: *Jungermannia sordida* Nees, Enum. Pl. Crypt. Jav. 41. 1830.

Type: Indonesia: Java: 'in tumulis Baduorom sanctis' Lindenb. Hep. 6480 (isotype: W).

Description: Mizutani (1970).

Illustration: Mizutani (1970).

Specimens examined: Australia, New South Wales, North Coast, Mt Warning National Park, Mt Warning summit track, 900 m, 28°24'S 153°16'E, 17 June 2005, *M.A.M. Renner 1441 & E.A. Brown*, NSW865976; *M.A.M. Renner 1436a & E.A. Brown*, NSW865969.

Distribution and habitats: new to New South Wales, where only known from Mt Warning on the north coast. At Mt Warning *Lejeunea sordida* grew as a trunk epiphyte on underside of a leaning tree trunk in low forest, and as a branch epiphyte on small branches of canopy trees on a forest edge adjacent an open expanse of exposed bedrock. *Lejeunea sordida* co-occurred with *Cheilolejeunea* spp., *Frullania* spp., *Lejeunea bischlerae*, *Lejeunea* spp., *Lopholejeunea* sp., and *Metzgeria* spp. Overseas *L. sordida* is widely distributed throughout Asian-Oceanic regions.

Recognition: *Lejeunea sordida* can be recognised by 1) the granular ornamentation on the dorsal and ventral lobe cell surfaces (more pronounced on dorsal surface); 2) the large, broadly ovate underleaves, 5–8× the stem width; that are 2) imbricate; 3) bifid and 4) have subauriculate bases; 5) the strongly inflated lobule carinal region, with inrolled lobule antical margin that is obscured in ventral view; 6) the squat obpyriform lobules; 7) the distinct notch, typically 90°, at the keel-lobe junction; 8) the distinct knee in the lobule arch associated with this notch; 9) the keel emerging at right angles to the stem and curving through 90°; 10) the bright yellow-green colour when fresh; 11) gynoecia produced terminally on leading axes, subtended by a single *Lejeunea*-type subfloral innovation that is again fertile, causing gynoecia to appear pseudolateral.

Lepidolejeunea integristipula (Jack & Steph.) R.M.Schust., Phytologia 45: 425. 1980.

Basionym: *Pycnolejeunea integristipula* Jack & Steph. Bot. Centralbl. 60: 107. 1894.

Type: Fiji, Viti insulae, Ovalau, in monte Tana-lailai, 1864, *Graeffe* (holotype *fide* Piippo (1986): G-20388)

Description: [from Australian material] forming pale green patches of long and parallel shoots on logs, trunks and leaves, also as scattered shoots entwined within dense epiphytic bryophyte mats. Shoots green when fresh, fading to yellow-brown then brown in herbaria, medium sized for family, to 17 mm long and 1.2 mm wide, branching infrequent and irregular, shoot system monomorphic, lateral branches

similar in stature to parent branch. Stems with seven rows of large inflated cortical cells, external walls thickened and yellow pigmented, cortical cells with bulging trigones, 10–15 rows of small medulla cells, bulging trigones at cell angles, walls yellow-pigmented. Rhizoids brown. Dorsal leaf-free strip absent, leaf insertion interlocking across the dorsal cortical cell. Branching *Lejeunea*-type, collar several discoid bracts, persistent. Lobes rotund-ovate, falcate, 380–680 μm long and 310–370 μm wide, spreading and weakly obliquely patent when moist, imbricate, stem obscured by lobes in dorsal view; apex rounded, lobe margins serrulate due to angular projection from each marginal cell, except at acroscopic and basiscopic base where marginal cells are smooth and margins entire; margins occassionally bearing rhizoids. Cells of lobe smooth, lobe cell surfaces unornamented, cell walls without secondary thickenings throughout except marginal cells which have triangular trigones at angles; with 15–20 ocelli scattered throughout, slightly larger otherwise weakly differentiated from surrounding cells in herbarium material (in living material visible as reflective points at 20× magnification). Lobules always normally developed, no explanate morphs seen in Australian material; one twentieth the lobe area, 80–110 μm long and 100–150 μm wide, ovate carinal region inflated, transversely and broadly ovate-rotund, cells smooth, keel emerging at acute angle of 45–60° from stem, arched through 15–30°, apex well postical to stem insertion, cells smooth to bulging; antical margin incurved, obscured in ventral view; with first tooth only, unicellular, falcate and acute, pointing sideways or backward; second tooth absent; papilla pyriform to spathulate, attached to lobule margin on the base of the first tooth cell. Underleaves reniform, 270–350 μm long and 360–640 μm wide 6–7× stem width, insertion arched, contiguous to imbricate, margins entire to serrulate, with ocelli scattered throughout. Asexual reproduction by caducous leaves, frequent, older shoot sectors may be entirely devoid of leaf lobes, lobes fragmenting at base, leaving basal 1 or 2 cell tiers affixed to stem at acroscopic end. Dioicous (?). Males not seen. Gynoecia terminal on leading axes, subtended by a single *Radula*-type innovation bearing Pycnolejeuneoid innovation sequence that continues vegetative growth and may again be fertile. Female bracts in one pair, subsymmetrical, one slightly small and with lobule apex acuminate, bract lobes obovate, 690–780 μm long and 470–550 μm wide at widest point, plane, margins serrulate, lobules 560–650 μm long and 260–310 μm wide the larger oblong, the smaller ovate, margins serrulate. Bract underleaf rotund to slightly obovate, 630–690 μm long and 610–680 μm wide, margins serrulate. Perianths and sporophyte not known in Australia.

Specimens examined: Australia: Queensland: Cook: Daintree National Park: Myall Beach campground, 4 m, 11 July 2005, *M.A.M. Renner 2056 & E.A. Brown*, NSW867276; *M.A.M. Renner 2057 & E.A. Brown*, NSW867277; Dubuji broadwalk near the northern end of Myall Beach, 11 July 2005, *M.A.M. Renner 2062a & E.A. Brown*, NSW867278; *M.A.M. Renner 2064 & E.A. Brown*, NSW867280.

Distribution and habitats: *Lepidolejeunea integristipula* is distributed throughout Asian-Oceanic regions from Borneo to Fiji (Pócs et al. 2011, this issue). Pócs & Streimann (2006) first reported *L. integristipula* for Australia, from collections made in swamp forest at sea-level within Daintree National Park in the vicinity of Cape Tribulation, the same area where Dr Elizabeth Brown and I independently collected it. *Lepidolejeunea integristipula* inhabits a range of microsites within lowland mesophyll rainforest, including the sides of rotting logs, the trunks of rainforest trees, and the leaves of large leaved tree and shrub species, all within swamp forest. *Lepidolejeunea integristipula* occurred with a range of other Lejeuneaceae, including *Lejeunea* sp. on

rotting logs, *Lopholejeunea eulopha*, *Schiffneriolejeunea pulopenangensis* on tree trunks, and *Leptolejeunea* sp. and *Drepanolejeunea* subg. *Rhapidolejeunea* sp. on leaves.

Recognition: *Lepidolejeunea integristipula* can be recognised by 1) the large reniform underleaves 6–7× the stem width; that are 2) entire and undivided; 3) contiguous to imbricate; 4) the lobules with sideways pointing first tooth; and 5) keel arching backward below the stem insertion, and forming an acute angle, 30–60°, with the stem; 6) the inflated carinal region and hemispherical outline of the antical half of the lobule; with 7) the antical margin obscured in ventral view; 8) the caducous leaf lobes, entire shoot sectors becoming devoid of leaves; 9) the production of marginal rhizoids from leaf lobes; 10) the presence of scattered ocelli in leaves and underleaves; 11) the crenulated lobe margin due to angular cell projections; 12) the presence of bulging trigones in stem medulla cells; 13) the vegetative branches exclusively of *Lejeunea*-type; and 14) the stem with cortical cells forming a distinct hyalodermis (Figs 3 & 4).

Cololejeunea planissima (Mitt.) Abeyw. Ceylon J. Sci. (Bio. Sci.) 2(1): 73. 1959.

Basionym: *Lejeunea planissima* Mitt. J. Proc. Linn. Soc. London 5: 117. 1861. *Physocolea planissima* (Mitt.) Steph., Spec. Hepat. 5: 900. 1916.

Type: Ceylon (Sri Lanka): Point Galle, *Gardner 1493* (isotype: G-1956).

Synonyms:

Physocolea triangululiloba Steph., Spec. Hepat. 5: 907. 1916.

Leptocolea nakaii Horik. J. Sci. Hiroshima Univ. ser. B. div. 2, 1: 18. 1931.

Leptocolea lanciloba (Steph.) A.W.Evans var. *nakaii* (Horik.) S.Hatt. J. Hattori Bot. Lab. 8: 38. 1952.

Leptocolea aoshimensis Horik., J. Sci. Hiroshima Univ. Ser. B, div. 2 1: 20. 1931.

Cololejeunea aoshimensis (Horik.) Hattori Jol. Hattori Bot. Lab. 19: 138. 1958.

Leptocolea miyajimensis Horik., Bot. Mag. Tokyo 46: 180 1932.

Description: Mizutani (1984).

Illustration: Mizutani (1984).

Specimen examined: Queensland: Wide Bay Noosa National Park, rain forest near Rangers hut, picnic point at northern point of park, Noosa Head, 14 February 1986, *H. Robinson, J. Windolf & G. Batianoff 86-0114*, BRI-AQ722685, as *Cololejeunea near aoshimensis*.

Distribution and habitats: distributed from Sri Lanka, through South-East Asia, including Vietnam and Malaysia. In Australia known from a single location in Queensland where it occurred as an isolated patch on the trunk of a rainforest tree.

Recognition: *Cololejeunea planissima* is similar to *C. lanciloba* but can be distinguished from that species by differences in the nature of the hyaline leaf border, the shape of the leaf lobe, and the shape of the leaf lobe basal cells, as summarised in the key to these

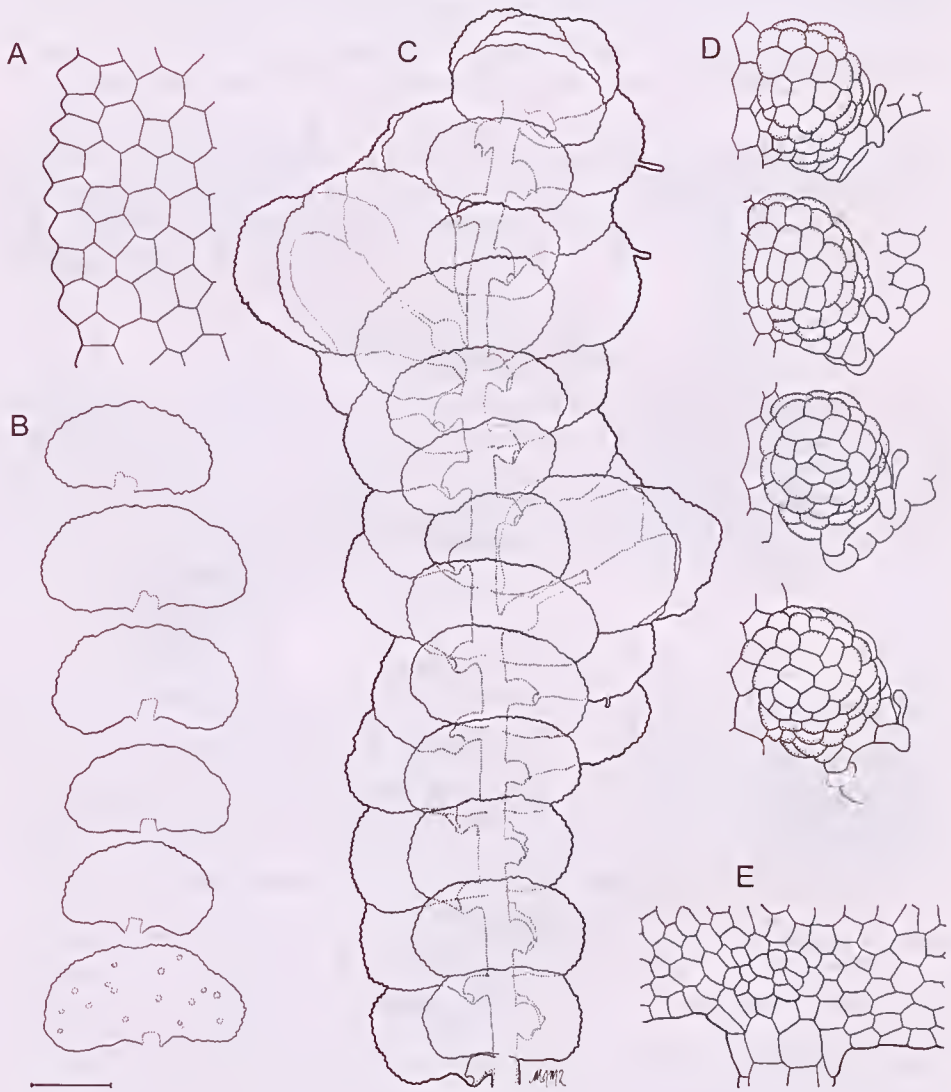

Fig. 3. *Lepidolejeunea integristipula*. **A,** lobe marginal cells. **B,** underleaves. **C,** shoot, ventral view. **D,** lobules. **E,** underleaf base. All from NSW867277. Scale bar: A = 35 mm; B, C = 240 mm; D, E = 50 mm.

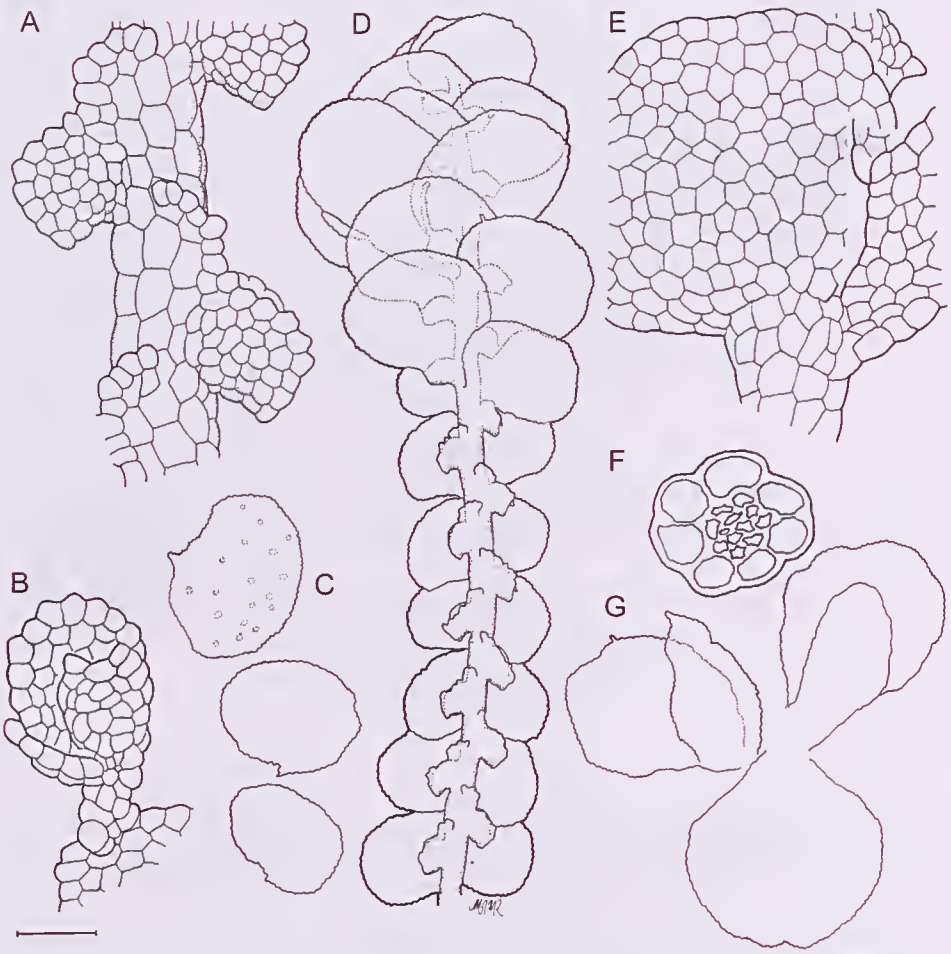

Fig. 4. *Lepidolejeunea integristipula.* **A,** stem, dorsal view. **B,** regenerant from lobe margin. **C,** caducous leaf lobes, ocelli indicated on one lobe. **D,** shoot, dorsal view. **E,** base of subfloral innovation, bract lobule at right, first branch underleaf at centre. **F,** stem transverse section. **G,** female bract gyre, flattened. All from NSW867277. Scale bar: A–C = 60 mm; C–E, G = 240 mm; F = 40 mm.

species presented by Mizutani (1984: 433), which I reproduce below:

1. Ventral margin of leaf-lobe bordered by hyaline cells; flat leaf-lobule usually narrowly triangular with acute apex; basal cells of dorsal side of leaf-lobe flexuous; usually on living leaves ..... ***C. lanciloba***

1. Ventral margin of leaf-lobe not bordered by hyaline cells; flat leaf-lobule usually ligulate with rounded apex; basal cells of dorsal side of leaf-lobe rectangular; usually on tree-trunks ***C. planissima***

Remarks: *Cololejeunea planissima* replaces *C. aoshimensis* for Australian material known by the latter name. *Cololejeunea aoshimensis* was listed as a synonym of *C. planissima* by Mizutani (1984) who noted that the latter was "Closely related to *C. lanciloba*", a species that also occurs in Australia.

Acknowledgments

I thank DERM (Department of Environment and Resource Management) for granting a permit to collect in Queensland; Elizabeth Brown (NSW) for company in the field; Anders Hagborg (F) and the ELPT (Early Land Plants Today) community for assistance with type details, references and species citations; Katherine Downs (NSW) for assistance with the NSW collections database; and two anonymous reviewers for comments on the manuscript.

References

Grolle R (1982) Ubersicht der Lejeuneaceae in Tasmanien. *Wissenschaftliche Zeitschrift der Friedrich-Schiller-Universitaet Jena Naturwissenschaftliche Reihe* 31: 207–227.

McCarthy P (2003) Catalogue of Australian Liverworts and Hornworts. Flora of Australia Supplementary series number 21. Australian Biological Resources Study: Canberra.

Meagher D (2003) New and interesting bryophyte records. *Australasian Bryological Newsletter* 48: 8–9.

Mizutani M (1970) Lejeuneaceae, subfamilies Lejeuneoideae and Cololejeuneoideae from Sabah (North Borneo). *Journal of the Hattori Botanical Laboratory* 33: 225–265.

Mizutani M (1984) Notes on the Lejeuneaceae. 9. *Cololejeunea lanciloba* and its related species in Japan. *Journal of the Hattori Botanical Laboratory* 57: 427–442.

Piippo, S. 1986. A monograph of the genera *Lepidolejeunea* and *Luteolejeunea* (Lejeuneaceae, Hepaticae). *Acta Botanica Fennica* 132: 1–69.

Pócs T & A Bernecker (2009) Overview of *Aphanolejeunea* (Jungermanniopsida) after 25 years. *Polish Botanical Journal* 54: 1–11.

Pócs T & H Streimann (1999) Epiphyllous liverworts from Queensland, Australia. *Bryobrothera* 5: 165–172.

Pócs T & H Streimann (2006) Contributions to the bryoflora of Australia, I. *Tropical Bryology* 27: 19–24.

Pócs T, Sass-Gyarmati A, Naikatini A, Tuiwawa M, Braggins J, Pócs S & von Konrat M (2011) New liverwort (Marchantiophyta) records for the Fiji Islands. *Telopea* 13: 455–494.

Schuster RM (1963) An annotated synopsis of the genera and subgenera of Lejeuneaceae. *Nova Hedwigia Beihefte* 9: 1–203.

Thiers B (1988) The Australian species of *Cololejeunea*. *Beiheft zur Nova Hedwigia* 90: 113–146.

Thiers B (1997) *Lejeunea bischlerae*, a new species of *Lejeunea* subgenus *Microlejeunea* from Australia. *Cryptogamie Bryologie Lichenologie* 18: 223–226.

Thiers BM & Gradstein SR (1989) Lejeuneaceae (Hepaticae) of Australia. I. Subfamily Ptychanthoideae. *Memiors of the New York Botanical Garden* 52: 1–79.

Tixier P (1985) Contribution a la Connaissance des Cololejeunoideae. Bryophytorum Bibliotheca Band 27. Strauss & Kramer: Germany.

Wilson R, Gradstein SR, Schneider H & Hienrichs J (2007) Unravelling the phylogeny of Lejeuneaceae (Jungermaniopsida): Evidence for four main lineages. *Molecular Phylogenetics and Evolution* 43: 270–282.

Zhu R-L & Lai M-J (2005) *Cheilolejeunea decursiva* (Sande Lac) R.M. Schust. and *C. ventricosa* (Schiffn) XL He (Lejeuneaceae, Hepaticae) new to Australia. *Journal of the Hattori Botanical Laboratory* 98: 193–203.

Zhu R-L & So ML (2001) Epiphyllous liverworts of China. *Nova Hedwigia, Beiheft* 121: 1–418.

Manuscript received 12 January 2011, accepted 04 August 2011

Telopea 13(3) 577–619

Australian Mosses — new chromosome numbers and a compilation of chromosome data

Helen P. Ramsay[1,2]

[1]*School of Biological Sciences, Macquarie University, NSW 2109*
[2]*National Herbarium of New South Wales, Sydney NSW 2000*
Email: hpramsay@ozemail.com.au

Abstract

Meiotic chromosome numbers, of some 180 collections are presented, comprising 80 species in 57 genera of Australian mosses from the following 29 families: Bartramiaceae, Brachytheciaceae, Bruchiaceae, Crypheaceae, Daltoniaceae, Dicranaceae, Ditrichaceae, Echinodiaceae, Encalyptaceae, Fabroniaceae, Fissidentaceae, Funariaceae, Grimmiaceae, Hedwigiaceae, Hypnodendraceae, Hypopterygiaceae, Lembophyllaceae, Leucobryaceae, Meteoriaceae, Mitteniaceae, Mniaceae, Neckeraceae, Pottiaceae, Pterobryaceae, Ptychomniaceae, Racopilaceae, Rhizogoniaceae, Sematophyllaceae, Thuidiaceae. Many of these counts (40) are new records for Australian mosses while the others are additional reports or confirmation of previously published chromosome numbers.

The identity of a specimen named as *Philonotis harrisi* Geh. *nom nud.* for which a chromosome count was published previously, has been updated and corrected to *Philonotis tenuis* (Taylor) Reichardt. Additional data and name corrections for some of the New Zealand moss chromosome reports by Ramsay (2009) for Funariaceae and Pottiaceae are included.

Introduction

Australia has an interesting and varied moss flora of approximately 1100 species (Streimann & Klazenga 2002) occurring in a wide range of habitats and vegetation types from desert to *Eucalyptus* forests and subtropical rainforests, in climates from subalpine to temperate, subtropical and tropical with a variety of rainfall regimes. The *Flora of Australia* project (McCarthy 2006) is exploring the taxonomy, distribution and species diversity of mosses in Australia.

During the last forty five years there have been many publications reporting chromosome numbers and chromosome behaviour in mosses from Australia and related areas such as Papua New Guinea and New Zealand. Some studies have been carried out separately for New Zealand mosses but most Australian results have been published by the author (Ramsay 1964, 1966b, 1967a, 1967b, 1973, 1974, 1977, 1979, 1982, 1983a, 1983b, 1983c, 1985, 1987, 1988, 1992, 1993, 1997, 2006, 2008, 2009), or in collaboration with others,

© 2011 Royal Botanic Gardens and Domain Trust ISSN0312-9764

e.g. Ramsay & Lewinsky (1984), Ramsay & Vitt (1986), Ramsay & Bergstrom (1995), Ramsay et al. (1995), Ramsay & Spence (1996), Ramsay et al. (2002).

In total, chromosome numbers for about 10% of Australian species have been published together with information on behaviour and karyotypes of chromosomes at meiosis and mitosis (Ramsay 1982, 1983c) and sex determination (Ramsay & Berrie 1982). The various cytological studies have shown that in the Australasian region the numbers and morphology of the chromosomes examined are comparable with those obtained in other parts of the world (Ramsay 1969, 1974, 1983b; Fritsch 1991). Some unique data for Australia and New Zealand include the low chromosome numbers n=4, 5 for Hypnodendraceae (Ramsay 1974, 1987, 1988) while the possible presence of sex chromosomes in *Macromitrium*, as indicated by dimorphic bivalents, anisospory and dwarfism of males, has been discussed (Ramsay 1966a, 1979, 1983c; Ramsay & Berrie 1982; Smith & Ramsay 1982; Ramsay & Vitt 1986). In addition, the presence of 'm' chromosomes in *Macromitrium* (Ramsay 1966a, 1974, 1983c) and various other mosses, e.g. *Dicranoloma* by Ramsay (1987, 1988) in Australia, and for other mosses in Europe, North America and Japan (summarised in Anderson & Bryan 1987) and demonstrated in *Plagiomnium affine* by Klos et al. (2001), have been noted. Intraspecific polyploidy is reported in a number of mosses (e.g. *Hypopterygium tamarisci* as *H. rotulatum* in Ramsay 1967b) while chromosome numbers, resulting from polyploidy in various colonising species, are particularly high in the Bryaceae, Pottiaceae and Funariaceae (Ramsay 1974, 1983c) increasing genetic diversity and possibly accounting for their success in stressful environments.

Variations in numbers and size as well as behaviour of bivalents between taxa at meiosis are demonstrated in photomicrographs in publications by many authors and summarised in Ramsay (1983c: figs 66–140). Relatively large chromosomes and small numbers are found in families such as Polytrichaceae, Hypnodendraceae, Rhizogoniaceae, while predominately high chromosome numbers and smaller-sized chromosomes occur in others, e.g. Pottiaceae and Funariaceae. Very small m-chromosomes that have specialised behaviour occur in a variety of mosses, e.g. *Macromitrium, Enthiostlwdon, Dicranoloma.* Many Japanese bryologists such as S. Inoue, Yano, Ono, Iwatsuki (see Fritsch 1991) have examined mitotic chromosomes and prepared karyotype formulae to demonstrate similarities or differences between related and unrelated moss taxa (for detailed comments refer to Ramsay 1982, 1983c).

Methods

Techniques follow those of Ramsay (1974, 1982, 1983c), i.e. fixing and staining in aceto-orcein or aceto-carmine, with preservation of slides by freezing with carbon dioxide and mounting in euparal. These permanent slides are still in good condition and numbers able to be checked more than 40 years later. All chromosome vouchers are listed under the HPR number (e.g. *10/84*)

Only drawings are presented here but earlier publications, referred to in the text (e.g. Ramsay 1966a, 1966b, 1974, 1983a, 1983c, 1987; Ramsay & Vitt 1986), demonstrate the appearance of the meiotic patterns for many species photographically.

The species names used here have been checked against Streimann & Klazenga (2002) and Tropicos (2011), sometimes resulting in changes of names used for earlier counts.

Where possible the earlier names have been brought up to date and referred to here. The familial classification used here follows that of Buck & Goffinet (2000), Goffinet & Buck (2004), Goffinet et al. (2008, 2010), and where genera have been transferred to different families in this new classification it has been noted in the text.

Chromosome Numbers

The present studies provide chromosome counts for previously unpublished taxa, additional numbers where these differ from earlier reports, and some extra data included in support of previously published studies. The results are arranged alphabetically by family, genus and species. Table 1 summarises the species examined, chromosome number, collector's name and voucher number with locality data for taxa studied and missing data (+) on localities for results published in Ramsay 1983c. Voucher specimens have been deposited in the National Herbarium of New South Wales (NSW). The chromosome numbers for 80 species in 57 genera and 29 families of Australian mosses are reported here.

Family Bartramiaceae

In Australia, the family consists of the following genera, *Bartramia, Breutelia, Conostomum*, and *Philonotis* (Gilmore 2006: 248–270). Chromosome numbers obtained previously are recorded in Fritsch (1991) and Goldblatt & Johnson (1994–2006). These include n=8, 9, 12, 16, 36, for *Bartramia* from India, Europe, North America, Japan and Australia; while *Conostomum* has n=8, 16 from Australia, U.S.A., Shetland Is., and South Georgia. *Philonotis* counts are mainly n=6 with a few n=12 from India, U.S.A., Japan, Europe, Australia (Ramsay 1967, 1974) and New Zealand (Ramsay 2009) while *Breutelia* has n=6 for species from Japan, Europe, Chile, South Georgia (Fritsch 1991) and Australia (Ramsay 1967, 1974, 1983c).

Additional data for Australia reported here include new records for *Breutelia* and *Philonotis* species and numbers are confirmed for the following two species of *Breutelia.*

1. Breutelia affinis (Hook.) Mitt n=6 Fig. 1.1

2. Breutelia pendula (Sm.) Mitt. n=6 Fig. 1.2

The recorded chromosome number n=6 (Ramsay 1967, 1974) is supported here for both *B. affinis* (*35/79*) and for *B. pendula* (*50/81*), the latter being the first count from Tasmania for *B. pendula*. A photomicrograph of the bivalents for the previous count for *B. pendula* appears in Ramsay (1983c: fig. 33).

3. Breutelia pseudophilonotis (Müll.Hal.) Watts & Whitel. n=6 Fig.1.3

There are no previous chromosome records for *B. pseudophilonotis*, a recently accepted species (Gilmore 2006: 260) (Table 1).

4. Philonotis tenuis (Taylor) Reichardt n=6 Figs 1.4 & 1.5

The chromosome number n=6 (*58/63*) has previously been recorded for a species identified as *Philonotis harrisi* Geh.in Watts & Whitel. (Ramsay 1967a, 1974), a *nom. nud.* based on a specimen from Cambewarra, N.S.W. (*W.W. Watts 2643*; NSW, SYD; Watts & Whitelegge1906). In his revision of the genus for Australia, Gilmore (2006) does not mention having examined the specimen of *P. harrisi* but when the above

Table 1. Chromosome numbers for Australian mosses.

All collections listed have the HPR voucher number regardless of the collector's number. * indicates a new species record and HPR number, + gives the voucher number and/or locality details lacking for records published in Ramsay 1983c; numbers in **bold** indicate additional number reports for species previously published; those without a prefix indicate additional reports that correspond to previously published Australian records.
Collections are by Ramsay unless cited otherwise.

Species	Chromosome number	Voucher number and locality details
Acrocladium chlamydophyllum	n=11(10+m)	TAS.: *53/81* Lake Dobson; *58/81* Liffy Falls
	n=20	TAS.: *49/81* Hartz Mt
+*Achrophyllum dentatum*	n=12	VIC.: *7/79* Sherbrooke Forest (Ramsay 1983c)
	n=c.20	*11/79* Sherbrooke Forest
	(irregular meiosis)	
**Aloina aloides* var. *ambigua*	n=26	N.S.W.: *27/83* Marulan (*W.B. Schofield 79240*)
Barbula calycina	n=13	N.S.W.:*3/74*, *7/74* Moss Vale; *29/79* Mt Wilson; *31/83* Wilson R; *43/83* Blackheath; *52/83* Gordon Falls, with *W.B. Schofield*
Braithwaitea sulcata	n=10	N.S.W.: *47/82* Mt Wilson
Breutelia affinis	n=6	N.S.W.: *35/79* Mt Wilson.
Breutelia pendula	n=6	TAS.: *50/81* Lake Dobson
*Breutelia pseudophilonotis	n=6	N.S.W.: *55/83* Echo Point
**Bryoerythrophyllum dubium*	n=13	N.S.W.: *57/83* Goulburn
**Calymperes tenerum*	n=10	QLD: *12/84* Cardwell (*H. Streimann 523*, CBG 28812); *10/84* Ingham (*H. Streimann 548*, CBG 28836)
**Camptochaete arbuscula* var. *arbuscula*	n=11	N.S.W.: *29/83* Sugarloaf Mt (*W.B. Schofield 79130*), *35/83* Woolgoolga
**Ceratodon purpureus* subsp. *convolutus*	**n=6**	A.C.T.: *43/84* Tidbinbilla; N.S.W.: *56/83* Goulburn; VIC.: *15/77* Mt William
	n=13	N.S.W.:*48/82* Kiandra; *46/84* Culcairn; *47/82* Yarrangobilly
**Cryphaea tenella*	n=11(10+m)	N.S.W.: *3/83* Minnimurra Falls; *25/79* Wauchope; *37/84* Mt Warning National Park
Cyathophorum bulbosum	n=5	VIC.: *21/79* Sherbrooke Forest
+*Dendrocryphaea tasmanica* (as *Cryphaea tasmanica* Ramsay 1983c)	n=11	TAS.: *11/81* Natural Arch

Dicranella dietrichiae	n=12	N.S.W.:*1/71* Epping, Sydney; *7/71* Cheltenham, Sydney; *23/73* Leura; *5/74* Moss Vale; *24/79*, *31/83*, *37/83*, *38/83*, *42/83* Wilson River–Wauchope area.
Dicranoloma dicarpum	n=7	TAS.: *56/81* Lake Dobson
Ditrichum difficile	n=13	A.C.T.: *10/87* Brindabellas; *42/84* Tidbinbilla; N.S.W.: *59/82* Yarrangobilly; *21/84* Alstonville; *30/84* Mt Warning
**Eccremidium pulchellum*	n=13	VIC.: *7/77* Hamilton
+*Echinodium hispidum*	n=10	VIC.: *18/79* Sherbrooke; N.S.W.: *7/75* Coffs Harbour (Ramsay 1983c); *18/81*, *22/81* Wiangarie State Forest
**Encalypta vulgaris* var. *vulgaris*	n=13	N.S.W.: *17/80* Yarrangobilly; *47/83* Jenolan Caves, *48/83* ibid. (*W.B. Schofield 79212*)
**Entosthodon apophysatus*	n=24	Vic.: *6/77* Hamilton; QLD: *44/81* Bunya State Forest
**Entosthodon radians*	n=52	N.S.W.: *3/87* Dorrigo, *W.B. Schofield 90756*; *53/83* Wilson River, Wauchope; *8/76* Kuringai Chase near Sphinx, Sydney; QLD: *16/84* Coolum Mt
**Entosthodon subnudus* var. *gracilis* (=*Funaria gracils* & *F. cuspidata*) (*F. cuspidata* Ramsay 1974)	n=26	N.S.W.: *41/83* Woolgoolga; *6/74* Ruscutters Bay Park, Sydney (*R.G. Coveny 5546*); *27/81* Bulladelah
**Euptychium cuspidatum*	n=5	N.S.W.: *6/75* Coffs Harbour *B.O. van Zanten*
Fabronia australis	n=30	N.S.W.:*1/74* Moss Vale
	n=20	QLD: *10/84* Atherton (*H. Streimann 548* CBG 29552)
	n=11	N.S.W.*19/80* Yarrangobilly
Fissidens oblongifolius	n=16	VIC.: *16/79* Sherbrooke Forest
Fissidens pallidus	n=10	VIC.: *5/79* Sherbrooke Forest
Funaria hygrometrica	n=28	N.S.W.: *4/74* Moss Vale; VIC.: *1/77* Hamilton
**Garovaglia elegans* subsp. *dietrichiae*	n=10	QLD: *11/84* Atherton (*H. Streimann 414* CBG 29252)
Glyphothecium sciuroides	n=7	N.S.W.: *50/84* Megalong Valley
**Grimmia pulvinata* var. *africana*	n=26	N.S.W.: *21/73* Blackheath
**Grimmia trichophylla*	n=13	N.S.W.: *17/84* Hallidays Point,
**Gymnostomum calcareum*	n=13	S.A.: *53/84* Coorong
**Hampeella pallens*	n=6	QLD: *33/81* Brindle Creek; N.S.W. *49/83* Wiangarie; *50/83* Wauchope
	n=12	N.S.W.: *9/83* Wiangarie State Forest
**Hedwigia ciliata*	n=11 (10+m)	N.S.W.: *63/82* Bowral; *39/83* Wauchope

**Hedwigidium integrifolium*	n=11	A.C.T.: *55/84* Tidbinbilla
**Hypnodendron comatulum*	n=4	QLD: *1/88*, *2/88* Mt Bartle Frere (*I.G. Stone s.n.*)
Hypnodendron vitiense subsp. *australe*	n=9	N.S.W.: *2/87* Dorrigo (*W.B. Schofield 90754*)
Hypopterygium tamarisci	n=9	N.S.W.: *1/75* Cambewarra; *7/80* Megalong Valley
	n=18	N.S.W.: *3/75* Cambewarra
Lembophyllum clandestinum	n=10	VIC.: *19/77*, *30/77* Mates Rest; *17/79* Sherbrooke; N.S.W.: *3/86* Wilson River
**Leptostomum erectum*	n=6 & n=12	N.S.W.: *2/76* Mt Wilson
**Leucobryum aduncum* var. *scalare*	n=6	VIC.: *19/79* Sassafras Creek; N.S.W:*14/81* Bulladelah; *13/75* Kempsey
Leucobryum candidum (?=*L. aduncum* var. *aduncum*)	n=11	N.S.W.; *5/72* Royal National Park; *1/73* Springwood
Lopidium concinnum	n=12 & **n=c. 18 (–21)**	VIC.: *14/79* Sassafras
Mesochaete undulata	n=10	N.S.W.: *36/83* Woolgoolga
+Mittenia plumula	n=10	VIC.: *22/79* Sherbrooke; N.S.W.: Mt Wilson
Orthotrichum tasmanicum var. *tasmanicum*	n=6	A.C.T.: *9/87* Brindabella Ra; N.S.W.: *6/88* Jenolan Caves (*A.J. Downing*)
Papillaria crocea	n=11	N.S.W.: *40/83* Wauchope (*W.8. Schofield*)
**Philonotis tenuis* (as *P.harrisi* in Ramsay1974)	n=6	N.S.W.: *30/81* Barrington Tops with *D.H.Vitt*; QLD: *58/63* Eungella
+Physcomitrium pyriforme (as *P. conicum* in Ramsay 1983c)	n=26	N.S.W.:*16/80* Yarrangobilly; *24/81* Wiangarie
Plagiomnium novae-seelandiae	n=14 (gametophytic mitosis)	N.S.W.: *4/88* Jenolan Caves with *P.M. Selkirk*
Ptychomnion aciculare	n=7	TAS.: *59/81* Hartz Mts
Pyrrhobryum medium (as P.brevifolium in Ramsay 1967, 1974)	n=6	QLD: 1/64 Mt Spec
Pyrrhobryum mnioides (as Rhizogonium mnioides in Ramsay1967, 1974)	n=12	VIC.: 16/77 & 18/77 Mates Rest, Otway
Pyrrhobryum paramattense (as *Rhzogonium paramattense* in Ramsay 1967, 1974)	n=6	N.S.W.: *11/75* Kempsey; *8/82* Wattagan State.Forest; *16/81*, *17/81* Wiangaree SF; *2/72* Royal National Park; VIC.: Mates Rest
	2n=12 (premeiotic mitosis)	VIC.: *12/79* Sherbrooke
Racopilum cuspidigerum var. *convolutaceum*	n=10	N.S.W.: *46/83* Big Scrub; *33/79* Mt Wilson; *12/75* Garie Beach (*P. Wallin*); *9/75* Comboyne; A.C.T.: *11/76* Tidbinbilla

**Radulina borbonica*	n=6	QLD: *9/84* Cardwell. (*H. Streimann*)
Rhizogonium novaehollandiae (Ramsay 1983c: fig. 104)	n=5	TAS.: *71/64* Mt Wellington
**Rhynchostegium muricatulum*	n=22	N.S.W.: *27/79* Wilson River; *39/83* Wauchope
	n=11	QLD: *25/84* Maleny, with *W.B. Schofield*
Rhynchostegium tenuifolium	n=11	N.S.W.: *40/84* Mt Warning; *31/79* Mt Wilson
	n=22	N.S.W.: *14/84* Megalong Valley
**Schistidium apocarpum*	n=13	N.S.W.: *49/82* Yarrangobilly Caves
Sclerodontium pallidum	n=11	N.S.W.: *7/76* Katoomba Falls
**Tetrapterum cylindricum*	n=26	VIC.: *14/77* Hamilton, N.S.W.: *23/81* Wiangaree State Forest
Thamnobryum pumilum	n=11(10+m)	N.S.W.: *45/83* Big Scrub
Thuidiopsis sparsa	n=11	N.S.W.: *2/75* Katoomba; *2/91* Macquarie University, Sydney; *32/84* Mt Wilson
**Tortella knightii*	n=13	N.S.W.: *20/84* Megalong Valley
	n=20	N.S.W.: *18/87* Jenolan Caves; *52/83* Gordon, Blue Mts
**Tortula andersonii*	n=14	N.S.W.: *46/82* Yarrangobilly Caves
	n=22	*46a/82* loc. cit.
**Tortula antarctica*	n=26	S.A.: *35/84* Port McDonnell
**Tortula atrovirens*	n=21	N.S.W.: *48/84* Culcairn
Tortula muralis	n=48	VIC.: *21/77* Melbourne University; *13/77* Hamilton; N.S.W.: *30/79* Blackheath; *3/91* Macquarie Univ; *28/73* Echo Point
	n=24	N.S.W.: *25/73* Echo Point
Tortula papillosa	n=7	N.S.W.: *42/82*, *58/82* Yarrangobilly; *25/81* Mt Banks
**Tortula truncata*	n=26	VIC.: *12/77* Hamilton
**Trematodon* sp. *cf. T. baileyii*	n=14	QLD: *7/74* Crystal Cascades Cairns
**Trematodon flexipes*	n=14	N.S.W.: *2/69* Barrington House
**Trematodon longescens*	n=15 (14+m)	N.S.W.: *28/81* Bulladelah
**Trematodon longicollis*	n=15	N.S.W.: *12/81* Barrington Tops
**Trematodon suberectus*	n=14	QLD: *27/84* Mt Coot-tha Botanic Gardens, Brisbane
**Weissia brachycarpa*	n=12	N.S.W.: *42/83* near Glen Innes
Weissia controversa	n=13	N.S.W.: *9/76* Bobbin Head; *13/84* Megalong Valley; *5/74* (*R.G. Coveny 5556*)

collection was compared to specimens of *Philonotis tenuis* named by Gilmore, it was found to be identical and *P. harrisi* is thus placed into synonymy with *P tenuis*.

Newton (1973) recorded n=6 from gametophytic mitotic studies of *P. tenuis* from New Zealand. The chromosome voucher (*58/63*) named as *P. harrisi* from Eungella in Queensland in Ramsay (1967a, 1974) has been re-examined and corrected to *P. tenuis*. An additional report here (*30/81*) from Barrington Tops, New South Wales based on meiotic examination also records the number for *B. tenuis* as n=6.

Family Brachytheciaceae

The Brachytheciaceae is represented in Australia by only a small number of the 43 genera. The main genera present are *Brachythecium, Eurhynchium, Rhynchostegiella* and *Rhynchostegium*.

In Australia chromosome data are only available for the genus *Rhynchostegium* with worldwide reports providing a range of numbers: n=10, 11, 10+m, 12, 13+m, 20, 20+2m, 22 (Fritsch1991; Goldblatt & Johnson 1994, 2003, 2006). The higher numbers indicate intraspecific polyploidy and aneuploidy, and m-bivalents have been reported. Former counts for Australian species are n=22(20+2m) for *R. tenuifolium* (this includes the report of n=22 for R. *laxatum* in Ramsay 1974 which has been checked and the name corrected to *R. tenuifolium*). A report from New Zealand for *R. tenuifolium* is n=11 (Ramsay 2009).

5. *Rhynchostegium muricatulum* (Hook.f. & Wilson) Reichardt n=11 no illustration

n=22 Figs 1.8 & 1.9

These are the first chromosome records for *R. muricatulum*, formerly *Eurhynchium*. Two separate chromosome numbers are reported here — one collection (*25/84*) from Maleny in Queensland had a count of n=11, whereas two others (*27/79, 39/83*, both from Wilson River, Wauchope, New South Wales but obtained at different times) had n=22 and were polyploid in origin. Meiotic behaviour was normal in each suggesting established allopolyploidy.

6. Rhynchostegium tenuifolium (Hedw.) Reichardt n=11 Fig.1.7
n=22 Fig. 1.6

Ramsay (1967a, 1974) obtained a chromosome count of n=22 with one or two m-bivalents for *R. tenuifolium* as *R. laxatum* (*14/66*) from Mt Wilson and one from the Royal National Park (*7/72*). An additional count of n=22 is recorded here from a later collection (*14/84*) from Megalong Valley (Table 1). Two other collections had a count of n=11, one (*31/79*) from the Royal National Park and the other (*40/84*) from Mt Warning.

Family Bruchiaceae

In Australia the family Bruchiaceae includes the two genera *Bruchia* and *Trematodon*, both terrestrial colonising species. *Bruchia* has the chromosome numbers n=14, 15, 16, 28, 30 recorded for species in U.S.A.(Fritsch 1991). Chromosome numbers have been reported for six species of *Trematodon* from Canada, USA and India, n=11, 12, 13+m, 13+2m, 14, 14+m, 28, and 28+2m indicating polyploidy and aneuploidy within the genus (Fritsch 1991, Goldblatt & Johnson 1994) as well as m-chromosomes in some species.

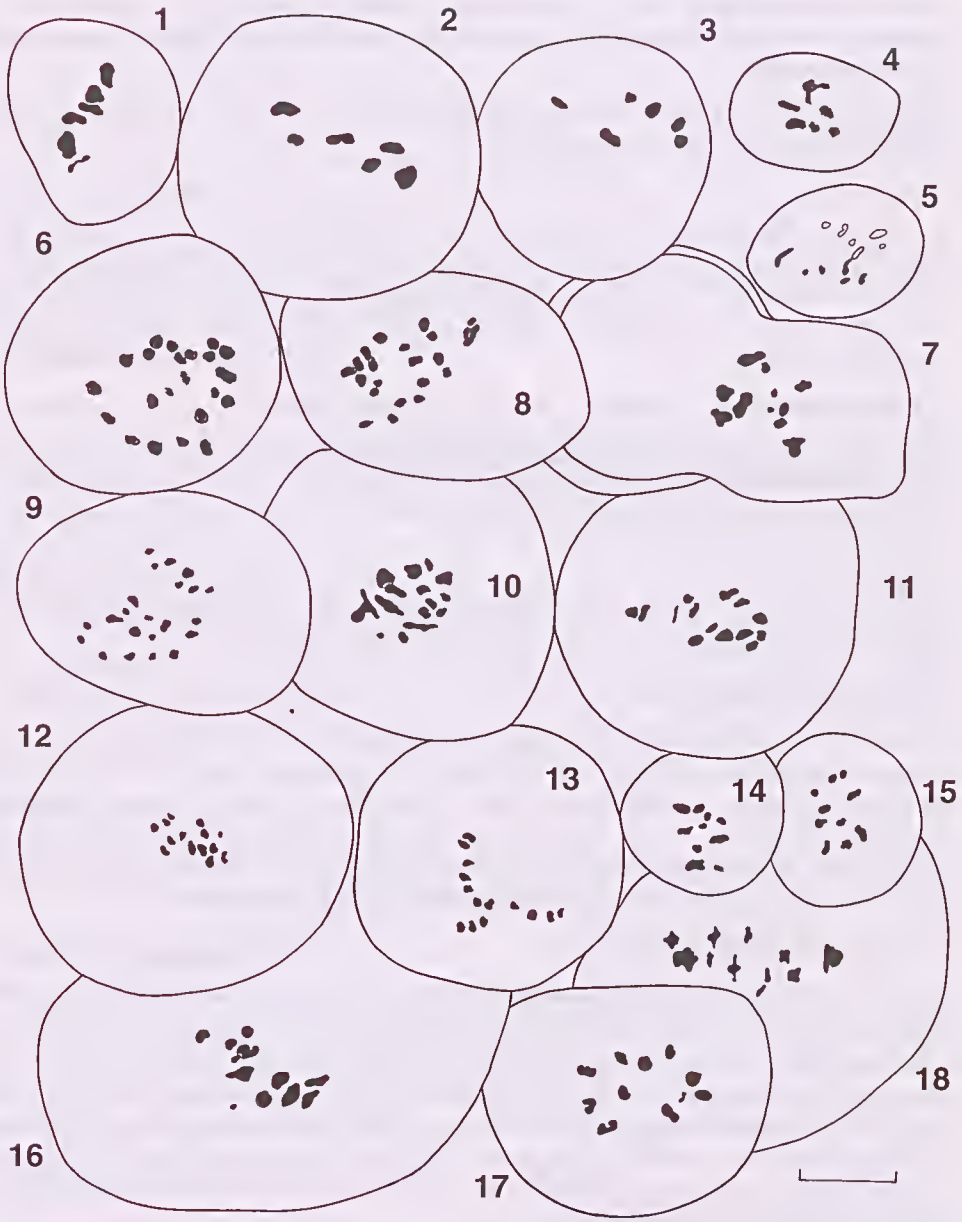

Fig. 1: 1–18. Chromosome numbers in Australian mosses (figures at Metaphase 1 of meiosis unless stated otherwise) — in families Bartramiaceae, Brachytheciaceae, Bruchiaceae, Calymperaceae, Cryphaeaceae. **1.** *Breutelia affinis* (*35/79*) n=6, a small bivalent is separating early; **2.** *Breutelia pendula* (*50/81*) n=6; **3.** *Breutelia pseudophilonotis* (*55/83*) n=6; **4 & 5.** *Philonotis tenuis:* **4.** (*30/81*) n=6; **5.** (*58/63*) n=6 Anaphase 1 showing 6 half bivalents at each pole; **6 & 7.** *Rhynchostegium tenuifolium:* **6.** (*7/72*) n=20; **7.** (*31/79*) n=11; **8 & 9.** *Rhynchostegium muricatulum*: **8.** (*27/79*) n=22; **9.** (*39/83*) n=22; **10.** *Trematodon suberectus* (*27/84*) n=14; **11.** *Trematodon* cf. *baileyi* (*7/74*) n=14; **12.** *Trematodon longescens* (*28/81*) n=15 (14+m.); **13.** *Trematodon flexipes* (*2/69*) n=14; **14 & 15.** *Calymperes tenerum*: **14.** (*12/84*) n=10; **15.** (*10/84*) n=10; **16 & 17.** *Cryphaea tenella*: **16.** (*3/83*) n=11 (10+m); **17.** (*25/79*) n=11(10+m); **18.** *Dendrocryphaea tasmanica* (*11/81*) n=11 (cf. fig 126 in Ramsay 1983c). Scale bar is 10 μm.

Trematodon, previously in the Dicranaceae, has been placed in the Bruchiaceae by Goffinet & Buck (2004) and has eight species recorded for Australia in Streimann & Klazenga (2002).

A count of n=14 has previously been reported for *T. suberectus* in New Zealand (Ramsay 2009), a species also present in Australia.

The following are the first Australian reports of chromosome numbers for *Trematodon* in Australia. Identification of specimens was difficult and the genus is under review at present by Seppelt & Ramsay. Five different species were examined cytologically- *T. longicollis, T. baileyi, T. longescens* (these latter two being related to *T. longicollis*), and two other species *T. flexipes* and *T. suberectus.* The collections were from Queensland and New South Wales.

7. Trematodon sp. (cf. *T. baileyi*) n=14 Fig. 1.11

One collection examined from Cairns, Queensland (*7/74*) is smaller than the *T. longescens* specimens, with a shorter seta and a capsule with a long neck and peristome teeth separate except at the base.This specimen had the chromosome number n=14 and lacked an m-chromosome. Being based on a small collection only, the lack of sufficient material makes it difficult to identify but its locality suggests it may be *T. baileyi,* which is a small endemic species from the Mulgrave River, Bellenden Ker region close to Cairns.

8. Trematodon flexipes Mitt. n=14 Fig. 1.13

T. flexipes is a small species with a short seta and a capsule with a neck about the same length as the urn. It is more widely distributed in Australasia than the other species, occurring in the more temperate regions of New South Wales, Victoria, Tasmania, Australian Capital Territory as well as in New Zealand and Macquarie Island. There are no previous chromosome counts. A collection of *T. flexipes* (*2/69*) from near Barrington Tops, New South Wales (Table 1) had the chromosome number n=14.

9. Trematodon longescens Müll.Hal. n=15 (14+m) Fig. 1.12

The distribution of *T. longescens,* an endemic Australian species, extends from far north Queensland along the coast and tablelands to Nowra south of Sydney with the most collections being from the Brisbane area of southeastern Queensland. There are no published illustations of *T. longescens.* The sporophyte has strong similarities to *T. longicollis* as illustrated in Magill (1981), Eddy (1988), Norris & Koponen (1990) and Magill & Rooy (1998) with the capsule neck consistently more than twice the length of the urn. The two species appear to differ in plant size, leaf set and structure, perichaetial leaves, the peristome and spore size.

The chromosome number n=15 (14+m) with an m-chromosome was determined for *T. longescens* (*28/81*) from Bulladelah, New South Wales.

10. Trematodon longicollis Michx. n=15 no illustration

T. longicollis is a very widespread species based on a type collection from North America and was first described in 1803 by Michaux. It seems to differ from *T. longescens* in leaf and sporophyte characteristics as explained above. Eddy (1988) has described and illustrated *T. longicollis* and records its distribution as pantropical and subtropical in Asia and Malesia. However, others give it as having a range into more temperate regions of Southern Africa (Magill 1991), eastern North America (Anderson & Crum

1981), India (Gangulee 1969), Papua New Guinea (Norris & Koponen 1990) and Japan (Noguchi 1987). For Australia, Streimann & Klazenga (2002) list *T. longicollis* as occurring only in Western Australia and Victoria, However, the revision in progress suggests it is more widespread with at least one collection (*S. Churchill*: CANB, NSW) extending its distribution to the northeastern tropics. There are still 50 collections made by I.G.Stone in northeastern Queensland, some of which may be *T. longicollis*, yet to be identified.

The chromosome number obtained for *T. longicollis* (*12/81*) from Barrington Tops, New South Wales is n=15, the same number as found in the collection of *T. longescens* examined in these studies, but lacking the m-chromosome.

11. Trematodon suberectus Mitt. n=14 Fig. 1.10

Trematodon suberectus is smaller than *T. longescens* with a shorter seta and a capsule with the neck less than twice as long as the urn. The collection studied here from Brisbane, Queensland (*27/84*; Fig. 1.9) had the number n=14. The chromosome number agrees with counts for two collections in New Zealand (Ramsay 2009).

Family Calymperaceae

The family Calymperaceae is represented mainly in tropical regions of Australia, although a few species are found in New South Wales. Five genera are listed for Australia (Reese & Stone 1995). The recorded chromosome numbers are n=13, 26 for one species of *Octoblepharum* from India, n=13 for three species of *Syrrhopodon* from India, Japan and U.S.A., and n=11 for one species of *Syrrhopodon* from Japan (Fritsch 1991). There are no previous chromosome reports for any Calymperaceae in Australia.

12. Calymperes tenerum Müll.Hal. n=10 Figs 1.14 & 1.15

Two collections of *C. tenerum* by Heinar Streimann from separate localities (*10/84*, *12/84* in North Queensland) had the chromosome number n=10.

Family Cryphaeaceae

The family Cryphaeaceae is a small tropical/subtropical family containing nine genera (Goffinet & Buck 2004). Following the revision by Enroth (1995, 1996) the genus *Cryphaea* is represented in Australia by three species (Streimann & Klazenga 2002). Chromosome numbers of n=10+m, 10+2m have been recorded previously for several species of *Cryphaea* from U.S.A., Europe and Australia (Fritsch 1991).

13. Cryphaea tenella (Schwägr.) Hornsch. ex Müll.Hal.
n=11 (10+m) Figs 1.16 & 1.17

The collections of *C. tenella* examined (*25/79*, *3/83*, *37/84*) came from three widely separate localities in New South Wales and all had the chromosome number n=11(10+m).

14. Dendrocryphaea tasmanica (Mitt.) Broth.
n=11 (10+m) Figs 1.18, 2.1 & 2.2

This was reported as *Cryphaea tasmanica* by Ramsay (1983c: fig. 126) with a count of n=11(10+m) but without locality or voucher number. These are added here (Table 1). The complement of n=11(10+m) as illustrated in Ramsay (1983c) is included here with the voucher number added.

Family Daltoniaceae

There are six genera present in Australia (previously in the family Hookeriaceae) and at present only two genera are recognised for the family Hookeriaceae (Goffinet & Buck 2008). A count is available for *Achrophyllum*.

15. Achrophyllum dentatum (Hook. & Wilson) Vitt. & Crosby

n=12 Fig. 2.17
n=c. 20 no illustration

The chromosome number n=20 was reported by Ramsay (1967a, 1974) for two collections (*9/64, 9/66*), one from N.S.W. the other from Victoria, of the only Australian species (as *Pterygophyllum dentatum*), with 80% of cells having abnormalities such as micronuclei and laggards.

In Ramsay (1983c: fig. 115) the chromosome number for *Achrophyllum dentatum* was reported as n=12 for a collection from Victoria, Sherbrooke Forest (*7/79*). The chromosome number of n=c. 20 is reported here for a separate collection (*11/79*) also from Sherbrooke Forest, Victoria. This is polyploid compared with the previous count, but no exact count was possible. Many meiotic irregularities were observed similar to those recorded and illustrated previously (Ramsay 1974) including multivalents and univalents as well as bivalents, while a bridge involving several bivalents at anaphase I suggested inversion hybridity. There was little evidence of any normal anaphase, and distribution of bivalents to poles was erratic. Tetrads were also abnormal with irregular spore numbers and laggards. This misbehaviour at meiosis suggests that the collection was possibly autopolyploid.

Family Dicranaceae

In Australia this family is represented by genera such as *Dicranella*, *Dicranoloma*, *Eucamptodon*, *Holomitrium*, *Leucoloma*, and *Sclerodontium*.

The genus *Dicranoloma* in Australasia consists of 26 species (Klazenga 2003). Ramsay (1967a, 1974, 1985, 2006) has published chromosome studies for the genus *Dicranoloma* in Australia, New Zealand and Papua New Guinea. Chromosome numbers reported so far include n=7, 8, 9 (7+2m), 12 from Australasia and n=14 for a single species from India (Fritsch 1991).

16. Dicranoloma dicarpum (Nees) Paris n=7 Fig. 2.5

A report of n=7, the first for Tasmania, is recorded here for a collection (*56/81*) of *Dicranoloma dicarpum* from Lake Dobson (Table 1) and agrees with previous numbers for this species (Ramsay 1974, 2006, 2009).

There are 12 species of *Dicranella* listed for Australia (Streimann & Klazenga 2002). The chromosome numbers for *Dicranella* include n=7, 12, 12+m, 13, 14, 15, 16 for nine species in India, U.S.A., Japan, Europe, Canada (Fritsch 1991, Goldblatt & Johnson 2003) including some with m-chromosomes. The only report for an Australian species is n=12 for *D. dietrichiae* (Ramsay 1967a, 1974) for which additional populations were examined here.

17. Dicranella dietrichiae (Müll.Hal) A.Jaeger n=12 Figs 2.3 & 2.4

The chromosome number n=12 is confirmed for seven additional populations of *D. dietrichiae* from different localities (*7/71, 23/73, 5/74, 24/79, 31/83, 37/83, 38/83,*

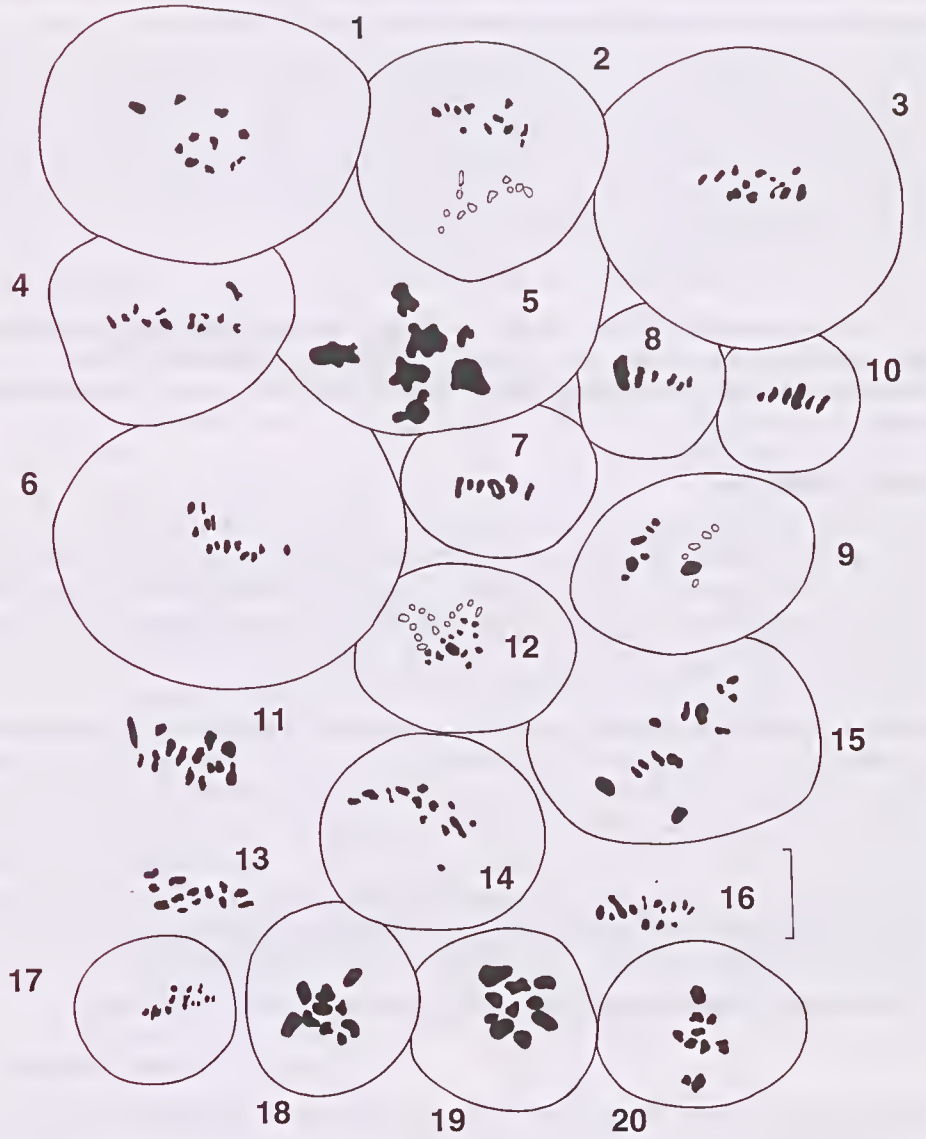

Fig. 2: 1–20. Chromosome numbers in Australian mosses (figures at Metaphase 1 of meiosis unless stated otherwise) — in families Cryphaceae (continued), Dicranaceae, Ditrichaceae, Daltoniaceae, Echinodiaceae. **1 & 2.** *Dendrocryphaea tasmanica* (continued) (*11/81*): **1.** n=11; **2.** Anaphase 1 with 11 half bivalents moving to each pole; **3 & 4.** *Dicranella dietrichiae*: **3.** (*24/79*) n=12; **4.** (*38/83*) n=12; **5.** *Dicranoloma dicarpum* (*56/81*) n=7; **6.** *Eccremidium pulchellum* (*7/77*) n=13; **7–12.** *Ceratodon purpureus*: **7.** (*56/83*) n=6; **8.** (*43/84*) n=6; **9.** (*43/84*) n=6 anaphase 1, with 6 half bivalents moving to opposite poles, note also the halves of one large bivalent are of unequal size; **10.** (*15/77*) n=6; **11.** (*48/82*) n=13; **12.** (*46/84*) n=13 anaphase 1- note the halves of the largest bivalent are unequal in size. **13–16.** *Ditrichum difficile*: **13.** (*10/87*) n=13; **14.** (*30/84*) n=13; **15.** (*59/82*) n=13; **16.** (*42/84*) n=13; **17.** *Achrophyllum dentatum* (*7/79*), fig. 115 in 1983c n=12; **18–20.** *Echinodium hispidum*:**18.** (*22/81*) n=10; **19.** (*18/81*) n=10; **20.** (*8/79*) n=10. Scale bar is 10 μm.

42/83) (Table 1). All had the chromosome number n=12 with normal meiosis thus supporting the original published number in Ramsay (1967, 1974).

The genus *Sclerodontium* (formerly known as *Dicnemoloma)* is represented in Australia by two species (Streimann & Klazenga 2002). In a collection of *S. pallidum* Ramsay (1977) reported the presence of enlarged sporocytes which appeared to be fused together and contained more than one nucleus with about 10% containing 5–8 spores, i.e. more than the normal 4 spores. These possibly represent aneuploid or polyploid spores but whether they would be viable is not known.

18. Sclerodontium pallidum (Hook.) Schwägr. n=11 no illustration

The chromosome number n=11 reported for *Sclerodontium pallidum (as Dicnemoloma pallidum)* in Ramsay (1967, 1974) is confirmed for an additional collection (*7/76*; Katoomba, Blue Mts, New South Wales, Table 1) in which meiotic behaviour was normal.

Family Ditrichaceae

The family Ditrichaceae includes 23 genera (Goffinet & Buck 2004) of which *Ditrichum, Ceratodon, Eccremidium* and *Pleuridium* are the main genera present in Australia. Chromosome numbers have been recorded previously for the Australian taxa *Ceratodon purpureus* n=13 and *Ditrichum difficile* n=13, 13+m (Ramsay 1974). There are no previous counts for *Eccremidium* while for *Pleuridium* the numbers n=7, 13, 26 are recorded (Fritsch 1991) although none are from Australia.

The chromosome numbers for the most well known and widespread species of *Ceratodon, C. purpureus* previously reported are n=11, 12, 13 with the most frequent being n=13 from Antarctica, Europe, India, Japan, North America, (Fritsch 1991, Goldblatt & Johnson 1994) and Australia (Ramsay 1974), while the number of n=6 (unpublished data from V.S. Bryan) is mentioned from Austria (Europe) for a single population in a discussion on mechanisms for variation in the species (Shaw & Beer 1999). All Australian material of *C. purpurens* belongs to the subspecies *convolutus* as recognised by Buck et al. (1990: 57) (refer to Streimann & Klazenga 2002).

19. Ceratodon purpureus (Hedw.) Brid subsp. ***convolutus*** (Reichardt) Burley
n=6 Figs 2.7–2.10
n=13 Figs 2.11 & 2.12

The identity of a number of additional collections of *Ceratodon purpurens* studied here was checked by R.D. Seppelt. Two different chromosome numbers were determined, n=6 and n=13. Three populations from localities widely separated in Australian Capital Territory, New South Wales (*56/83, 43/84*) and from Victoria (*15/77*) have the newly recorded chromosome number of n=6, representing the basic number for Ceratodon.. These complements included one larger somewhat dimorphic bivalent, the dimorphy being observed in the two half bivalents at anaphase I (Fig. 2.9).

Three other collections (*47/82, 48/82, 46/84*) from separate localities in New South Wales (Table 1) have the previously reported number n=13 (Ramsay 1967a, 1974). Evidence of possible dimorphy in the n=13 species is suggested in the anaphase I configurations where the largest half bivalent in one plate is larger than the equivalent one in the other plate.

The earliest records of cytology in *Ceratodon purpureus* by Shimotomi & Kimura (1934), in Japan and Jachimsky (1935) in Germany provided the chromosome number of n=13. They noted a large heteromorphic (dimorphic) bivalent at meiosis. In their studies of gametophytic mitosis and the karyotypes, Shimotomai & Kimura (1934) noted that a large metacentric member of the bivalent was present in the female complement (supported by Ramsay 1969) while the male equivalent was smaller. It was concluded that the differentiated chromosomes possibly represented X/Y sex chromosomes. Not everyone investigating this taxon has reached the same conclusion, nor has the largest bivalent always been recorded as heteromorphic. The sex of populations is not always cited but *Ceratodon purpureus* is usually considered to be dioicous.

These studies provide the first published illustrations of the chromosome number n=6 for *Ceratodon purpureus*. At metaphase 1 the largest bivalent is apparently dimorphic. Although the chromosome number n=12 has not been found, it can be surmised that autopolyploidy would result in the number n=12, and such plants would be expected to include some monoicous specimens. Based on Bryan's unpublished information of n=6 in a European collection, Shaw & Beer (1999) suggest that the derivation of the number n=13 in *Ceratodon purpureus* may result from autopolyploidy followed by subsequent aneuploidy. There are no illustrations for Bryan's chromosome record and no mention of a dimorphic bivalent.

DNA studies based on population genetic analyses using three unlinked loci to examine biogeographical patterns by McDaniel & Shaw (2005) showed that in *Ceratodon purpureus* "Australasian haplotypes were more closely related to northern hemisphere haplotypes than to haplotypes found in the equatorial regions. Collectively these data suggest that long distance migration within the northern hemisphere and Australasian regions is common (relative to mutation rate) and that migration between these two regions, potentially via equatorial populations, is more frequent than migration among equatorial populations".

The genus *Ditrichum* has been revised for Australia by Seppelt (1982, 1996) with eight species recognised. Previous chromosome number reports for 19 species from North America, India, and Europe in Fritsch (1991) and Goldblatt & Johnson (1994, 1996) are n=13 or 26 with a few having an additional 'm' chromosome. Records of n=13 are available for two species in New Zealand (Ramsay 2009) and n=13, 13+m for *D. difficile* in Australia (Ramsay (1967a, 1974).

20. Ditrichum difficile (Duby) M.Fleisch. n=13 Figs 2.13–2.16

Five additional collections of *Ditrichum difficile (59/82, 21/84, 30/84, 42/84, 10/87)* from several different localities in the Australian Capital Territory and New South Wales were examined. All had the chromosome number n=13, the same as previously recorded for this species by Ramsay (1967a, 1974).

There are six species of *Eccremidium* in Australia (Streimann & Klazenga 2002). No chromosome number has been reported previously for the genus.

21. Eccremidium pulchellum (Hook.f. & Wilson) Müll.Hal.
n=13 Fig. 2.6

In the collection of *E. pulchellum* from Victoria examined here (*7/77*) the chromosome number was determined as n=13.

Family Echinodiaceae

The Echinodiaceae is a small family with the single genus *Echinodium* occurring in Australia, New Caledonia and New Zealand. In Australia, *E. hispidum* occurs in the eastern states and also on Lord Howe Island where a second species is present.

The chromosome number for *E. hispidum* was incorrectly listed in Ramsay (1983c: 221) as n=9. The correct number n=10 was, however, reported in Ramsay (1983c: fig. 129) and Fritsch (1991).

22. Echinodium hispidum (Hook.f. & Wilson) Reichardt n=10 Figs 2.18–2.20

The previous report in Ramsay (1983c) did not include the locality. The data came from a collection (*18/79*) from Victoria (Sherbrooke Forest) and is supported here by three collections (*7/75*, *18/81*, *22/81*) from New South Wales.

Family Encalyptaceae

This is a small family of distinctive calcareous mosses containing the single genus *Encalypta*. Species occur in both the northern and southern hemispheres with 3 species recorded for Australia (Streimann & Klazenga 2002).

There are no previous chromosome number reports for *Encalypta* in Australia, although numbers recorded from various places in Europe include n=13, 26, 39 (Fritsch 1991).

23. Encalypta vulgaris Hedw. var. ***vulgaris*** n=13 Fig. 3.1

The number n=13 was determined in three collections (*17/80*, *47/83*, *48/83*) from two different localities in New South Wales (Table 1).

Family Fabroniaceae

In the family Fabroniaceae as recognised by Goffinet & Buck (2004), a group of epiphytic mosses, five of the genera occur in Australia. The chromosome number n=11 has already been recorded for three different species in the genus *Fabronia*, one each from India, Japan and Europe (Fritsch 1991)

In Australia *Fabronia* has four species, the most common and widely distributed being *F. australis*. The chromosome number of n=20 was reported by Ramsay (1967a, 1974) for this species.

24. Fabronia australis Hook. n=30 Fig. 3.4
n=20 Fig. 3.5
n=11 Fig. 3.6

The chromosome number reported here for an additional population (*10/84*) of *F. australis* collected by Heinar Streimann from Queensland is n=20 and supports the earlier record by Ramsay (1967a, 1974). A second collection (*1/74*) from Moss Vale, New South Wales had the chromosome number n=30. In both cases, although the numbers are polyploid, meiosis was normal. In addition, a collection from Yarrangobilly(*19/80*) had the number n=11 as previously reported in northern hemisphere specimens (Fritsch 1991).

Family Fissidentaceae

Although the Fissidentaceae contains the single genus *Fissidens*, it is a large and universally distributed family of terrestrial mosses. In Australia it includes about 70 taxa

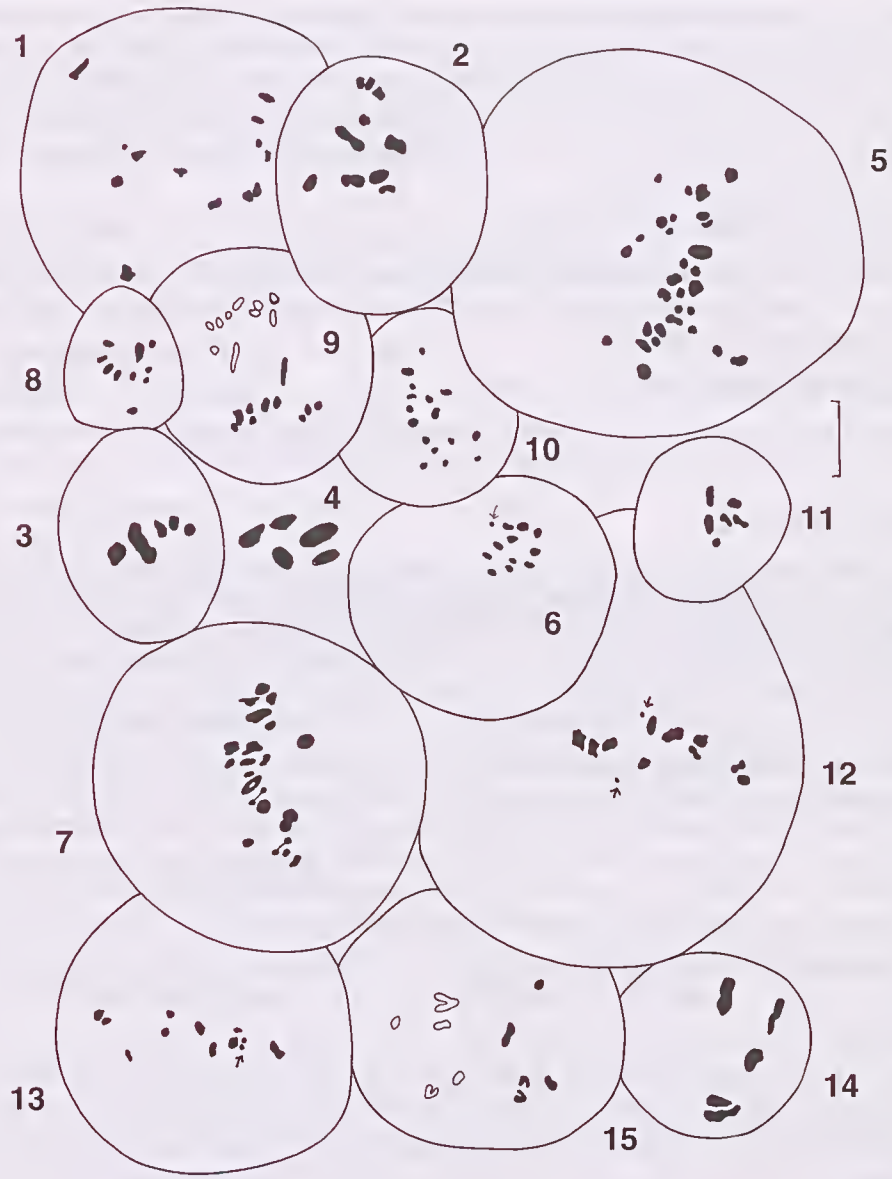

Fig. 3: 1–15. Chromosome numbers in Australian mosses (figures at Metaphase 1 of meiosis unless stated otherwise) – in families Encalyptaceae, Ptychomniaceae (Garovagliaceae), Fabroniaceae, Fissidentaceae Sematophyllaceae, Hedwigiaceae, Hypopterygiaceae. 1. *Encalypta vulgaris* (*17/80*) n=13(12+m); 2. *Garovaglia elegans* subsp. *dietrichiae* (*11/84*) n=10; 3 & 4. *Euptychium cuspidatum* (*6/75*) n=5; 5–7. *Fabronia australis:* 5. (*1/74*) n=30; 6. (*10/84*) n=20; 7. (*19/80*) n=11; 8 & 9. *Fissidens pallidus* (*5/79*): 8. n=10; 9. Anaphase 1 showing 10 half-bivalents moving to each pole; 10. *Fissidens oblongifolius* (*16/79*) n=16; 11. *Radulina borbonica* (*9/84*) n=6, note one bivalent is slightly smaller than others in the complement, but is not an m-chromosome in its relative size and behaviour; 12. *Hedwigia ciliata* (*63/82*) n=11(10+m) note the m-chromosome (arrow); 13. *Hedwigidium integrifolium* (*55/84*) n=11 (10+m) note m-bivalent separating (arrows); 14 & 15. *Cyathophorum bulbosum* (*21/79*): 14. n=5; 15. Anaphase 1, note five half-bivalents moving to opposite poles, one clearly larger. Scale bar is 10 μm.

with subspecies and varieties (Streimann & Klazenga 2002). There are chromosome reports for the genus from many parts of the world and numbers include n=5, 6, 8, 10, 12, 13, 16, 24. The low numbers n=5, 6, 8 are present with some intraspecific polyploids of these n=10, 12, 16, 24 (Fritsch 1991), indicating that polyploidy has played a role in the genus as it has in many other small colonising species such as the Pottiaceae. The most common number is n=12.

25. Fissidens pallidus Hook.f. & Wilson n=10 Figs 3.7 & 3.8

Ramsay (1967a, 1974) recorded the chromosome number n=13 for *F. pungens* and n=12 for *F. pallidus* from New South Wales. The number for the specimens of *F. pallidus* (*5/79*) examined here was n=10.

26 Fissidens oblongifolius Hook.f. & Wilson n=16 Fig. 3.9

This is the first chromosome record for *F. oblongifolius* and the number, obtained from a Victorian collection (*16/79*), is n=16.

Family Funariaceae

The family Funariaceae contains many small terrestrial mosses distributed worldwide. The stems are simple and some species are commonly associated with pots in glasshouses, e.g. *Funaria hygrometrica*. The family includes species with n=7, 14 but often species have high chromosome numbers, e.g. n=26, 27, 28, 45, 52, 54, 56 (Fritsch 1991) suggesting that polyploidy has played a significant role in evolution within this family of colonising mosses. The low count of n=7 for *Entosthodon wichurae* Fleisch. in India (Anand & Kumar cited by Fritsch 1991; Goldblatt & Johnson 2000) supports a basic number of x=7 for the genus, as proposed by Ramsay (1974). Fife (1985) revised the genera in the Funariaceae, and in discussing the phylogeny, refers to two main clusters of chromosome numbers — one with n=9 and its multiples and the other with n=14 (x=7) and multiples. The number n=26, present in a number of species, could be derived from n=7 or 9 by polyploidy followed by aneuploidy.

For Australia Fife & Seppelt (2001) recognised *Entosthodon* as including most species formerly in *Funaria*, while *Funaria hygrometrica* and F. *microstoma* are retained in the genus *Funaria*.

Chromosome numbers for some Australian Funariaceae were published in Ramsay (1974). These are *Entosthodon submudus* (Hook.f. & Wilson) Fife var. *gracilis* (as *Funaria cuspidata* Hook.f. & Wilson) n=26; *Entosthodon muehlenbergii* (as *Funaria glabra* Taylor) n=52; and *Funaria hygrometrica* Hedw. n=28. Recently recorded chromosome counts for New Zealand collections by Ramsay (2009) are n=24 for *Entosthodon laxus* (*1/84*) and for two undetermined specimens of *Entosthodon* (*79/84*) n=18 and (*97/84*) n=26. The identity of the latter two has since been checked by Allan Fife and they have been determined as *Entosthodon laxus*, giving this species the three different numbers n=18, n=24 and n=26 in New Zealand.

Photomicrographs of the chromosome complement of *Entosthodon muehlenbergii* (as *Funaria glabra*) with a count of n=52+2m appear in Ramsay (1974: fig. 133) and with n=52 in Ramsay (1983c: fig. 36).

A count of n=21 was recorded from USSR by Lazarenko et al. cited in Fritsch (1991) for *Funaria hygrometrica*, a species in which the most frequent number is n=28 (Fritsch 1991). Recently n=21 has been reported for this species, possibly *F. hygrometrica* var.

calvescens, from Papua New Guinea (Ramsay 2008). The chromosome number n=26 was recorded for *Physcomitrium pyriforme* (as *P. conicum*) in Australia by Ramsay (1983c). Additional chromosome numbers are reported here for several species in the genus *Entosthodon*, for *Funaria hygrometrica* and one *for Physcomitrium*.

27. Entosthodon apophysata (Taylor) Mitt. n=24 Figs 4.2 & 4.3

Funaria. apophysata (Taylor) Broth. is synonymous with *Entosthodon apophysatus* (Fife & Seppelt 2001). The chromosome number determined here for two collections, one from Hamilton in Victoria (*6/77*) the other (*44/81*) from Queensland, is n=24 and they are the first reports for this species.

28. Entosthodon radians (Hedw.) Müll.Hal. n=52 Figs 4.7 & 4.8

A number of collections of this species (*8/76*, *53/83*, *3/87*) from various localities, Kuringai near Sydney, Dorrigo and Wauchope (New South Wales) and from Coolum (Queensland), all had the chromosome number n=52.

29. Entosthodon subnudus (Taylor) Mitt. var. ***gracilis*** (Hook.f. & Wilson) Fife n=26 Figs 4.5 & 4.6

This taxon now incorporates two former species of *Funaria*, *F. cuspidata* and *F. gracilis* (Fife & Seppelt 2001). The chromosome number n=26 has been reported previously for *Funaria cuspidata* in Ramsay (1974) and is recorded here for New South Wales collections of what would previously have been considered *Funaria gracilis* (*41/83*) from Woolgoolga and also *F. cuspidata* (*6/74*, *27/81*) from Sydney.

A range of chromosome numbers n=14, 21, 28, 56 are recorded for the common weedy *Funaria hygrometrica*, from Europe, North America, India, Japan (Fritsch 1991) and n=28 for Australia (Ramsay 1974).

30. Funaria hygrometrica Hedw. n=28 Fig. 4.6

The chromosome number n=28, already determined for at least seven collections previously (Ramsay 1974), is confirmed here for a collection (*4/74*) from New South Wales, Kenthurst, Sydney and one (*1/77*) from Hamilton, Victoria.

In Australia, the genus *Physcomitrium* is represented by the single species *P. pyriforme* (syn *P. conicum*) (Fife & Seppelt 2001). Chromosome numbers recorded for *P. pyriforme* include n=9, 18, 26, 27, 36, 45, 52, 54 from various countries in Europe as well as India and U.S.A. (Fritsch 1991) with n=26 and 52 occurring most frequently in other species.

31. Physcomitrium pyriforme (Hedw.) Hampe n=26 Fig. 4.1

A collection of *P. pyriforme* from Australia was first published as *P. conicum* with the chromosome number n=26 in Ramsay (1983c: fig. 90) without locality data and voucher number. These are: *16/80*, Yarrongobilly Caves area, New South Wales. A count of n=26 was obtained here for an additional collection (*24/81*) from Wiangarie.

Family Grimmiaceae

The family Grimmiaceae contains 17 genera and is widespread in the world with *Grimmia* (13 species), *Schistidium* (5 species) and *Racomitrium* (11 species) occurring in Australia (Streimann & Klazenga 2002). Chromosome numbers are consistently n=13 with a few aneuploids of n=14 and polyploids n=26 for *Grimmia*; n=13, 14 and n=26 for *Schistidium apocarpum* in Europe, North America, New Zealand (Fritsch

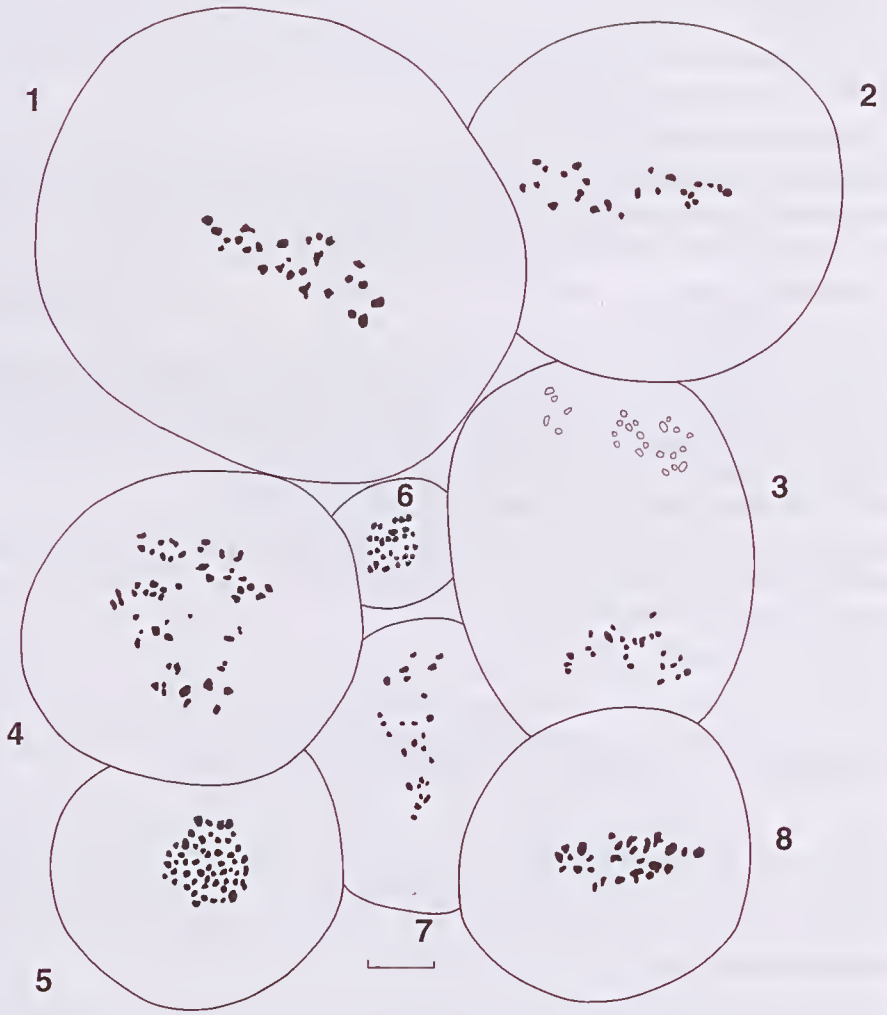

Fig 4: 1–8. Chromosome numbers in Australian mosses (figures at metaphase 1 of meiosis unless stated otherwise) — Funariaceae. 1. *Physcomitrium pyriforme* (*24/81*) n=26. 2 & 3 *Entosthodon apophysatus* (*6/77*); 2. n=24; 3. Anaphase 1 note 24 half bivalents moving to each pole; 4. *Funaria hygrometrica* (*4/74*) n=28; 5 & 6.*Entosthodon subnudus* var.*gracilis*: 5. (*6/74*) n=26; 6. (*41/83*) n=26; 7 & 8. *Entosthodon radians*: 7. (*3/87*) n=52; 8. (*8/76*) n=52. Scale bar is 10 µm.

1991, Goldblatt & Johnson 1994, Ramsay 2009). *Racomitrium* has the numbers n=7, 12, 13, 14 (Fritsch 1991). There are no previous counts for *Grimmia* or *Schistidium* in Australia but n=12, the most common number for the genus (Fritsch 1991) was reported for *R. crispulum* (Ramsay 1967a, 1974).

32. Grimmia pulvinata (Hedw.) Sm. var. ***africana*** (Hedw.) Hook.f. & Wilson n=26 Fig. 7.2

Previous chromosome numbers for *G. pulvinata* are n=10, 13, 14, 26, 26+m (Fritsch 1991) but none are for Australia or for the variety *africana*. The number obtained here is n=26 (*21/73*).

33. Grimmia trichophylla Grev. n=13 Fig. 7.1

The chromosome number n=13 has been recorded from Europe, and North America (Fritsch 1991) but no previous reports are available for *G. trichophylla* in Australia. The chromosome number is n=13 for one collection from New South Wales (*17/84*).

34. Schistidium apocarpum (Hedw.) Bruch. & Schimp. n=13 Fig. 7.3

The chromosome number in *Schistidium apocarpum* (*49/82*), was determined as n=13 and is the first report for this genus for Australia.

Family Hedwigiaceae

The Hedwigiaceae is a small family of mosses with five genera, of which, *Hedwigia* and *Hedwigidium* occur in Australia. The cosmopolitan species *Hedwigia ciliata* has been studied in Europe, U.S.A., India and Japan (n=11; Fritsch 1991, Goldblatt & Johnson 1994) and in Finland, Russia and Poland where polyploids with n=22 are reported (Kuta et al. 1990) but there are no previous reports for this species or any other in Australia.

35. Hedwigia ciliata (Hedw.) P.Beauv. n=11(10+m) Fig. 3.11

Australian populations from Bowral (*63/82*) and Wauchope (*39/83*) had the chromosome number n=11 (10+m) which includes an m-chromosome.

36. Hedwigidium integrifolium (P.Beauv.) Dixon n=11 Fig. 3.12

This is the first chromosome record for the genus *Hedwigidium*. The number n=11 in the collection (*55/84*) from the Australian Captial Territory is consistent with that recorded for *Hedwigia* but lacked the m-chromosome.

Family Hypnodendraceae

Hypnodendraceae, with the single genus *Hypnodendron*, has been studied cytologically by Ramsay (1974, 1983a, 1987) in Australia and New Zealand, two species from Papua New Guinea (*H. dendroides* & *H. diversifolium)* and one (*H. reinwardtii*) from Malaysia. The low number of n=4 has been recorded for several species of *Hypnodendron* (*H. comosum, H. comatum*, and *H. dendroides*). Of these, *H. comatum* and *H. comosum* occur in New Zealand, the latter also being present in southern temperate Australia. The tropical species, *H. dendroides* in Papua New Guinea, had a chromosome count of n=4 obtained as 2n=8 at premeiotic mitosis (Ramsay 1987). Other species had the number n=5 (3 species) or n=9 (5 species) (Ramsay 1987).

37. Hypnodendron comatulum (Geh. ex Broth.) Touw n=4 Fig. 5.10

This is the first chromosome record for *Hypnodendron comatulum*, an endemic species from northeast Queensland (Ramsay & Cairns 2004). The two collections studied here (*1/88, 2/88*) were obtained by Ilma Stone from Mt Bartle Frere. The sterile plants were maintained in covered dishes in the laboratory near a window until young shoots were produced and the apices harvested for chromosome counts. The chromosome number obtained was n=4. *Hypnodendron comatulum* belongs to the section *Comosa* (Touw 1971), the only one in which all species counted so far have the chromosome number n=4.

The chromosome complement of n=4 for *H. comatulum* lacks the small m-chromosome found in the complements of species with n=5 such as *H. diversifolium* from Papua New Guinea, with 2n=10 counted at premeiotic mitosis (Ramsay 1987: fig. 25) and *H. menziesii* n=5 (Newton 1973) from gametophytic mitosis from New Zealand. There are no previous reports of mitotic counts in species with the number n=4.

38. Hypnodendron vitiense Vitt var. ***australe*** Touw n=9 no illustration

The chromosome number of n=9 obtained here for *H. vitiense* (*2/87*) is from a different locality to previous counts: Cambewarra in New South Wales, and agrees with previous counts (Ramsay 1987).

Family Hypopterygiaceae

The present allocation of genera to the family that occur in Australia includes *Cyathophorum, Hypopterygium* and *Lopidium* (Goffinet & Buck 2004).

39. Cyathophorum bulbosum (Hedw.) Müll.Hal. n=5 Figs 3.13 & 3.14

An additional count for *Cyathorphorum bulbosum* from a population in Victoria (*21/79*) supports the previously recorded chromosome number n=5 (Ramsay 1967b, 1974) and is illustrated here at metaphase 1 and anaphase 1. Both Newton (1973) at mitosis and Ramsay (2009) at meiosis have reported n=5 for New Zealand specimens.

A world revision of the genus *Hypopterygium* has been published in recent years by Kruijer (2002) who also treated the genus for the *Flora of Australia* (Kruijer 2006). Several species of *Hypopterygium* recorded in Streimann & Klazenga (2002), including *H. rotulatum*, have been placed into synonymy with *H. tamarisci* (Krujer 2006). Earlier chromosome records of n=9, 18, c. 27, 36 have been reported for *H. rotulatum (=H. tamarisci)* in Ramsay (1967a) together with chromosome reports for material from Venezuela n=18, and for Japan n=9, 18 (Kruijer 2006). This species is widespread in pantropical and warm temperate regions of central and southern Africa, India, Asia north to Japan, central and South America, Australasia and Oceania with various growth forms recognised. Photomicrographs of the complement of *H tamarisci* (as *H. rotulatum*) were presented for populations with n=9 and n=36 in Ramsay (1983a: figs 40 & 41). The chromosome number n=6 has been recorded for both *H. didictyon* (as *H. novae-seelandiae)* by Newton (1973) from New Zealand and for *H. vreisii* from Papua New Guinea (Ramsay 2008).

40. Hypopterygium tamarisci (SW) Brid. ex Müll.Hal. n=9 Figs 5.1 & 5.2
n=18 no illustration

Collections studied in both new and previous accounts are all from New South Wales. Chromosome counts of n=9, 18, c. 27, 36 were reported by Ramsay (1967a) for a large

population of specimens all growing on a log more than 2 metres long across a stream at Mt Wilson in 1964. Unfortunately, the log and its mosses were washed away and the population destroyed in a snow storm several years later. However, collections made on the stream bank since then still include at least the chromosome numbers n=9 and n=18. Both these numbers are also reported here from Cambewarra n=9 (*1/75*) and n=18 (*3/75*).

The genus *Lopidium* is represented in Australia by two species (Streimann & Klazenga 2002). Previous chromosome counts are for two species, one from Japan with n=11 (Fritsch 1991) and one from Australia, *L. concinum*, with a count of n=12 (Ramsay 1974).

41. Lopidium concinum (Hook.) Wilson	n=12	Fig. 5.3
	n=c. 18 to 21	Figs 5.4 & 5.5
	irregular meiosis	Figs 5.6 & 5.7

A chromosome count of n=12 was obtained for some specimens from the collection (*14/79*) in which meiosis was normal. Others in the same collection (*14/79*) had capsules in which some sporocytes had normal meiosis and others had abnormal meiosis, indicating polyploidy. In these sporocytes, some apparently normal metaphase I plates indicated the count was n=c. 18–21, but in many cells there were both univalents and some multivalents, with at least two trivalents. This suggests that the plants might be triploids on a base of x=6, deduced for a count of n=18 since the original counts in Ramsay (1974) had n=12 chromosomes. Higher counts would indicate early separation of bivalents or failure to pair. There was also evidence of unequal distribution of chromosomes at anaphase I and laggards were often present at telophase I. Tetrads contained unequal numbers of spores, sometimes with laggards as well.

Family Lembophyllaceae

Five genera in the family Lembophyllaceae (Goffinet & Buck 2004) occur in Australia These include *Acrocladium, Camptochaete* and *Lembophyllum* for which chromosome counts have been obtained previously (Ramsay 1967a, 1974; Fritsch 1991). The genus *Camptochaete* was revised by Tangney (1997a), as was the rest of the family in Australasia (Tangney 1997b).

The genus *Acrocladium,* usually associated with the family Lembophyllaceae, has been placed in its own family (Klazenga pers. comm.) for the *Flora of Australia* upcoming second moss volume but is retained here at this stage. The only published chromosome count is n=11 (10+m) for *A. chlamydophyllum* from Australia (Ramsay 1967a, 1974).

42. Acrocladium chlamydophyllum	n=11(10+m)	Fig.5.8
(Hook.f. & Wilson) Müll.Hal. & Broth.	n=20	Fig. 5.9

The chromosome count of n=11(10+m) obtained here from Tasmania and Victoria (*53/81, 58/81*) confirms the original count, while a count of n=20 for another collection (*49/81*) indicates polyploidy. Meiotic behaviour in these capsules was regular with no sign of multivalents or irregular division.

In Australia the genus *Camptochaete* is represented by 6 species (Tangney 1997a, b; Streimann & Klazenga 2002). To reflect nomenclatural changes, *C. ramulosa*=*C. deflexa* (Wilson) A.Jaeger with the numbers n=10, 11, 22 and *C. vaga*=*C. excavata* (Taylor) A.Jaeger n=11 for reports in Ramsay (1967a, 1974).

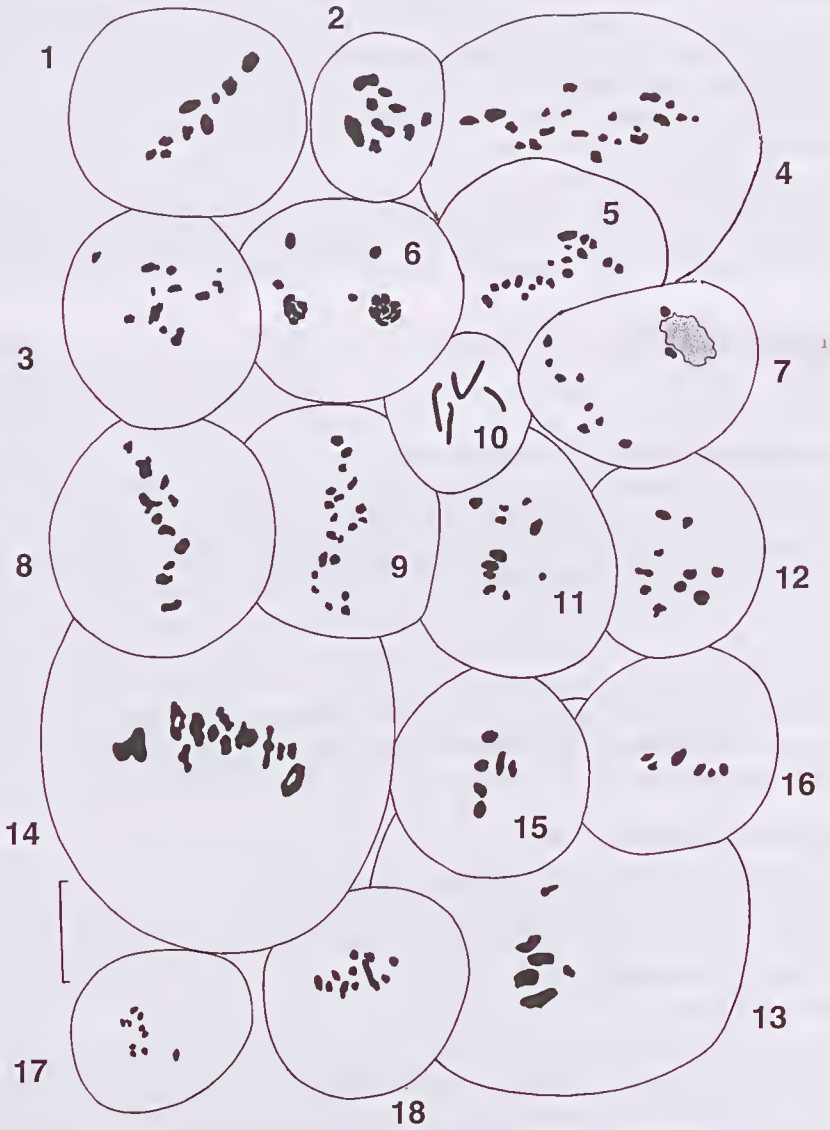

Fig. 5: 1–18. Chromosome numbers in Australian mosses (figures at Metaphase 1 of meiosis unless stated otherwise) — in families Hypopterygiaceae (contd), Hypnodendraceae, Lembophyllaceae, Leptostomaceae, Leucobryaceae, Mitteniaceae, Meteoriaceae. **1 & 2.** *Hypopterygium tamarisci*: **1.** (*4/72*) n=9; **2.** (*3/75*) n=9; **3–7** *Lopidium concinnum*; **3.** (*14/79*) n=12; **4 & 5.** polyploids (*14/79*) **4.** n=22; **5.** n=18; **6 & 7.** (*14/79*), meiotic irregularities **6.** misdivisions at Metaphase 1 to Anaphase 1, note most half bivalents grouped together except for two towards each pole; **7.** misdivisions at Anaphase 1 to Telophase 1, note eight half bivalents at one pole, at other end all clumped except for two; **8 & 9.** *Acrocladium chlamydophyllum*: **8.** (*53/81*) n=11; **9.** (*49/81*) n=20; **10.** *Hypnodendron comatulum* (*2/88*) n=4 gametophytic mitotic chromosomes; **11.** *Camptochaete arbuscula* var. *arbuscula* (*29/83*) n=11; **12.** *Lembophyllum clandestinum* (*17/79*) n=10; **13 & 14.** *Leptostomum erectum*: (*2/76*) **13.** n=12; **14.** n=6; **15 & 16.** *Leucobryum aduncum* var. *scalare* : **15.** (*13/75*) n=6; **16.** (*14/81*) n=6; **17.** *Mittenia plumula* (*22/79*) n=10; **18.** *Papillaria crocea* (*46/83*) n=11, note large rod shaped bivalent. Scale bar is 10 μm

43. Camptochaete arbuscula (Sm.) Reichardt var. ***arbuscula*** n=11 Fig. 5.11

Three separate collections (*19/77*, *29/83*, *35/83*) had the chromosome number n=11, a number common to all three species examined so far in Australia.

A recent review of the genus *Lembophyllum* (Tangney 2008) recognises two separate species — *L. divulsum* and *L. clandestinum*. Previously these two species have been treated as varieties of the single species *L. divulsum* by Sainsbury (1948), Scott & Stone (1976) and Fife (1995) for Australasia.

44. Lembophyllum clandestinum (Hook.f. & Wilson) Wijk & Margad.
n=10 Fig. 5.12

The chromosome count of n=10 obtained here in an additional three collections, one from Wilson R., New South Wales (*3/86*) and two others (*30/77*, *17/79*) representing the first records from Victoria, agree with the previous count published as *L. divulsum* var. *clandestinum*.

Family Leptostomaceae

The family Leptostomaceae contains the single genus *Leptostomum* distributed in Australia, New Zealand and Papua New Guinea. Previous chromosome records are n=6, 12 for *L. inclinans* in Australia (Ramsay 1967a, 1974) and n=6 for *L. inclinans* in New Zealand (Ramsay 2009).

45. Leptostomum erectum R.Br. n=6 Fig. 5.13
n=12 Fig. 5.14

This is the first chromosome report for the species *L. erectum* from New South Wales. The two numbers n=6 and n=12 are recorded for different specimens in a collection from the Blue Mts (2/76). Both these numbers have previously been recorded for *L. inclinans* (Ramsay 1974).

Family Leucobryaceae

As presently recognised by Goffinet & Buck (2004) there are 10 genera in the family Leucobryaceae, including *Campylopus* and *Leucobryum,* that occur in Australia. Chromosome records for *Campylopus* include n=10, 11, 12, 13, 15, c. 18 with n=13 for *C. introflexus* for Australia (Ramsay 1967a, 1974). For *Leucobryum* the numbers recorded are n=6, 11, 13, 14 for several species in the northern hemisphere - U.S.A., Europe, Japan, and China (Fritsch 1991; Goldblatt & Johnson 1994, 1996, 2003, 2006), n=10 for *L. sanctum* and *L. javense* from Papua New Guinea (Ramsay 2008).The number n=6 was reported for *L. albidum* by Anderson & Bryan (1958) but Mehra & Khanna (1961) questioned the number as the meiotic configurations seemed unusual. However, Przywara et al. (1983) recorded n=6 for *L. glaucum* in Poland while n=11 has been found for this species in other parts of Europe (Fritsch 1991). The most frequent chromosome number recorded for species studied so far is n=11.

N. Klazenga, who has been studying the genus for the *Flora of Australia*, has checked the names of specimens examined here.

46. Leucobryum candidum (Brid. ex Beauv.) Wilson n=11 no illustration

A previous count of n=11 for three populations named as *L. candidum* var. *pentastichum* (Dozy & Molk.) Dixon was published by Ramsay (1967a, 1974). Additional collections examined here (*5/72*, *1/73*) also had n=11.This variety has been placed into synonymy

with *L. aduncum* var. *aduncum* by Yamaguchi (1993) and Klazenga (pers. comm.) is still considering whether *L. candidum* may be synonymous with *L. aduncum*.

47. L. aduncum Dozy & Molk var. ***scalare*** (Müll.Hal. ex M.Fleisch.) A.Eddy
n=6 Figs 5.15 & 5.16

This study provides the first chromosome records for this taxon with a count of n=6 for two collections from New South Wales (*13/75, 14/81*) and one from Victoria (*19/79*) and adds a third species to the list in *Leucobryum* with the number n=6, suggesting this is probably the basic number for the genus.

Family Meteoriaceae

Australian members of the family Meteoriaceae were revised by Streimann (1991, 1992). As presently recognised, there are 22 genera excluding *Papillaria* (Goffinet & Buck 2004) of which six, (seven including *Papillaria),* are recorded for Australia.

Papillaria was synonymised with *Meteorium* by Buck (1994: p. 61), but this has not been accepted yet for Australian species. Streimann, who revised the Australian species, although agreeing to some extent with Buck, retained *Papillaria* as there are no appropriate combinations for these species in *Meteorium* (Streimann & Klazenga 2002). Chromosome records for the family are n=11 or n=11, 22 for three species of Papillaria from Australia (Ramsay 1967a, 1974), with n=9, 10 for three species from India. In addition n=10 is reported for some species of *Meteorium* from Japan, and n=11 for species of *Meteoriopsis* from Japan and India (Fritsch 1991, Goldblatt & Johnson 1998).

48. Papillaria crocea (Hampe) A.Jaeger n=11 Fig. 5.18

This report of the chromosome number n=11, the first for the species *P. crocea,* agrees with that so far recorded for three other species *P. amblyacis, P. flavolimbata*, and *P. flexicaulis* (Ramsay 1974). The collection (*40/83*) came from Wauchope, New South Wales and was collected with W.B. Schofield.

Family Mitteniaceae

The Mitteniaceae is a small monotypic Australasian family of mosses with a specialised perennial luminescent protonema and unique peristome structure (Stone 1961b). The chromosome number of n=10 was recorded for *M. plumula* from Australia (Ramsay 1983c fig 109) without the chromosome voucher number and locality data.

49. Mittenia plumula (Mitt.) Lindb. n=10 Fig 5.17

The drawing of the Ramsay (1983c) specimen (*22/79*, Sassafras Creek, Victoria) is included here for easy comparison with other taxa.

Family Mniaceae

The Mniaceae is a largely northern hemisphere family with 15 genera including *Pohlia* and *Schizymenium* recently transferred from the family Bryaceae by Goffinet & Buck (2004). There have been extensive studies of the chromosomes in a number of genera, including karyotypes of mitotic complements as well as heterochromatin properties summarised in Newton (1986). For *Mnium* and *Plagiomnium* the recorded chromosome numbers for various species in the northern hemisphere are n=6, 7, 8, 12 14 with many examples of karyotypes (Fritsch 1991) and n=14 for one species of

Orthomnion. For *Pohlia*, numbers recorded are n=10, 11, 13, 14, 22, 33 and 40 while a range of numbers, n=11, 20, 22, 33, the most frequent number being n=22, are recorded for the single species *P. nutans* from the northern hemisphere, particularly Europe and North America (Fritsch 1991). Ramsay & Spence (1996) record n=22 for *P. nutans* in Australia. The chromosome number for *Mielichhoferia*, which has been synonymised with *Schizymenium*, is n=10 (Goldblatt & Johnson 1994).

Previous counts for various *Plagiomnium* species from many regions, e.g. Europe, Japan, North America and India, China, Papua New Guinea (Fritsch 1991; Goldblatt & Johnson 2003, 2006; Ramsay 2008) include n=6, 7, 8, 12, 14 sometimes with both n=6 & 7 or n=6 & 12, 7 & 14 occurring in the same species. While the number n=6 occurs in *Plagiomnium affine*, a series of counts n=6, 7, 12 and 18 have been reported by Klos et al. (2001) who noted that specimens of one variety had the number n=6 plus 2, 3 or 4 m-chromosomes.

50. Plagiomnium novae-zealandiae (Colenso) T.J.Kop. n=14 Fig. 7. 20

This is the first chromosome number recorded for *Plagiomnium novae-zealandiae*, a species which occurs in Australia and New Zealand. The specimen studied (*4/88*), came from the Jenolan Caves area in New South Wales. The n=14 chromosomes, examined at gametophytic mitosis, are varied in size and shape but some appear as pairs, suggesting a polyploid origin.

Family Neckeraceae

Eight, mainly tropical, genera in the family Neckeraceae occur in Australia, including *Neckera, Homaliodendron, Touwia, Neckeropsis* and *Thamnobryum*. Chromosome numbers recorded in Fritsch (1991) are n=10, 11 for three species of *Homaliodendron* from India and Japan, n=10, 11, 12 for *Neckera* spp. from Europe and Japan and n=10 for *Neckeropsis* from Japan while n=11, 22 have been reported for *Thamnobryum* species from Japan, Europe (Fritsch 1991).

The genus *Thamnobryum* has three species in Australia with counts of n=11 for *T. pandum* (Ramsay 1967a, 1974) and n=11 (10+m) for *T. pumilum* (Ramsay 1983c: fig.119).

51. Thamnobryum pumilum (Hook.f. & Wilson) Nieuwl.

n=11(10+m) no illustration

This chromosome record of n=11(10+m) from The Big Scrub, a remnant of tropical rainforest in north-eastern New South Wales (*45/83*) confirms that reported in Ramsay (1983c: fig. 119) from Mt Wilson, New South Wales (*24/64*).

Family Orthotrichaceae

Previous chromosome studies on various genera in the family Orthotrichaceae have been published in Ramsay (1966, 1974, 1979, 1984, 2007), Ramsay & Lewinsky (1984), Ramsay & Vitt (1986), Ramsay & Bergstrom (1995), Ramsay et al. (1995) for a number of species from Australia, New Zealand, Heard Island and Papua New Guinea.

52. Orthotrichum tasmanicum Hook. f. & Wilson var. ***tasmanicum***

n=6 no illustration

Additional chromosome counts for *O. tasmanicum* (Table 1) are noted here for two collections, one from the Australian Captial Territory (*9/87*) and one from Jenolan

Caves, New South Wales (*6/88*). The chromosome number of n=6 agrees with previous counts for this species and is not illustrated here.

Family Pottiaceae

Genera in the very large family Pottiaceae were revised by Zander (1993) with many name changes but a number of Australian taxa were not examined in detail. Revisions are presently in progress for this family in the *Flora of Australia* so names in Streimann & Klazenga (2002) are accepted here until the new work is published. Of the genera now recognised by Goffinet & Buck (2004) some, such as *Barbula, Ephemerum, Tortella, Tortula, Syntrichia, Trichostomum, Weissia* contain a number of species in Australia which have been studied cytologically. However, the unique small genera *Phascopsis, Stonea, Uleobryum* which were described by Stone (1980, 1989, 1984) with additional data in Jolley & Milne (2007) have not yet been examined. The family is noted for the many taxa with high chromosome numbers and a range of numbers within species.

In Australia, *Aloina* is a genus with three species (Streimann & Klazenga 2002). Chromosome numbers for this genus are generally high, n=24, 26, 28, 48 although one count for *A. rigida* is n=12 from Poland (Kuta et al. 1995). Records from overseas include n=26 for *Aloina aloides* from Great Britain (Fritsch 1991) and n=24 for *A. aloides* var. *ambigua* from Europe and U.S.A.

53. Aloina aloides (Schultz) Kindb. var. ***ambigua*** (Bruch & Schimp.) E.J.Craig. n=26 Fig. 6.1

The specimens of *A. aloides* var *ambigua* studied here were collected by W.B. Schofield at Marulan, New South Wales (*27/83*). The chromosome number obtained is n=26 which matches the number for *A. aloides* but the number for var. *ambigua* has been recorded as n=24 in previous studies overseas (Fritsch 1991).

Barbula is a large genus distributed worldwide with the chromosome numbers n=7, 11, 12, 13, 14, 24, 26 recorded from North America, India China, Japan, (Fritsch 1991, Goldblatt & Johnson 1994).There are 17 species recognised for Australia (Streimann & Klazenga 2002) of which at least seven are considered endemic. The genus is at present under review for the *Flora of Australia*. Some species previously named as *Tortella* are now in synonymy with *Barbula* (Zander 1993), including the Australian species *Tortella calycina=Barbula calycina*. There are possibly four Australian species retained in the genus *Tortella* (Streimann & Klazenga 2002) but no previous chromosome number reports for any of them. The low number n=7 has been published for one species of *Tortella* from Europe (Fritsch 1991, Goldblatt & Johnson 1996) while numbers previously recorded for species from North America and Europe (Fritsch 1991) are n=13, 13+m, 14, 15, 30, 52. Australian chromosome records published for *Barbula calycina* n=13, 30, 52 were reported as *Tortella calycina* by Ramsay (1967a, 1974).

54. Barbula calycina Schwägr. n=13 Figs 6.3–6.5

Additional chromosome number reports for *Barbula calycina* (*9/73, 3/74, 29/79, 31/83, 43/83*) confirm the number n=13 and represent collections from several different localities in New South Wales (Table 1).

Several species of *Bryoerythrophyllum* from India had the chromosome number n=13 (Goldblatt & Johnson 1994, 2003) but there are no previous records from Australia.

55. Bryoerythrophyllum dubium (Schwägr.) P.Sollman n=13 Fig. 6.2

In *Bryoerythrophyllum*, the Australasian species *B. binnsii* (R.Br.Ter.) Dix., has been placed into synonymy with the more widespread species *B. dubium* (Schwägr.) Sollman (Sollman 2002).The chromosome number n=13 was determined for one collection (*57/83*) from Goulburn, New South Wales.

The genus *Gymnostomum* has only the one species, *G. aeruginosum*, listed for Australia (Streimann & Klazenga 2002). *Gymnostomum aeruginosum* and *G.calcareum* are considered conspecific by Zander (1977: 259) but not by Catcheside (1980) or Catcheside & Stone (1988) who retain them as separate species. Previous chromosome counts for three species in the genus from U.S.A., Europe and India are all n=13 (Fritsch 1991).

56. Gymnostomum calcareum Nees & Hornsch. n=13 no illustration

This is the first chromosome number reported for an Australian population of *G. calcareum*. The collection examined here (*53/84*) from the Coorong in South Australia had the chromosome number n=13.

There are no previous chromosome counts for the genus *Tetrapterum*, a genus with five recorded species for Australia (Streimann & Klazenga 2002).

57. Tetrapterum cylindricum (Taylor) A.Jaeger n=26 Fig. 6.17

The chromosome number of n=26 reported here in two separate collections (*14/77*, *23/81*), suggests a polyploid origin and the normal meiotic behaviour supports established allopolyploidy.

58. Tortella knightii (Mitt.) Broth. n=13 Figs 6.6 & 6.7
n=20 Fig. 6.8

These are the first chromosome number records for *Tortella knightii*, a species distributed in New South Wales, Victoria and Tasmania. One collection studied here (*20/84*) had the chromosome number n=13, while two others (*52/83*, *18/87*) had the number n=20. All were collected in the Blue Mountains, New South Wales.

In Australia, 21 species are listed for *Tortula* in Streimann & Klazenga (2002). Many of these were cited as *Syntrichia* in Zander (1977) but are under review for the *Flora of Australia*. Chromosome numbers recorded worldwide for the large genus *Tortula* are varied and include n=7 (6+m), 7, 12, 13, 24, 26, 30, 36, 40, 44, 48, 50, 52, 60, 66. The high numbers indicate a high degree of polyploidy for a number of species such as *T. muralis*, *T. subulata*, *T. mucronifolia* (Fritsch 1991, Goldblatt & Johnson 2003).

Previously recorded chromosome numbers for Australian species are n=48 for *T. andersonii* (as *T. bealeyensis*); n=7 (6+m), and n=12 for *T. papillosa* and n=48 for *T. muralis*. (Ramsay 1967a, 1974). The identity of the collections of *T. brevisetacea* from New Zealand (n=26; Ramsay 2009), is corrected here to *T. antarctica*, the same number as Australian reports below.

59. Tortula andersonii Åongstr. n=14 Fig. 6.13
n=22 Fig. 6.12

In addition to the previous report of n=48 (Ramsay 1974, as *T. bealeyensis*) two different

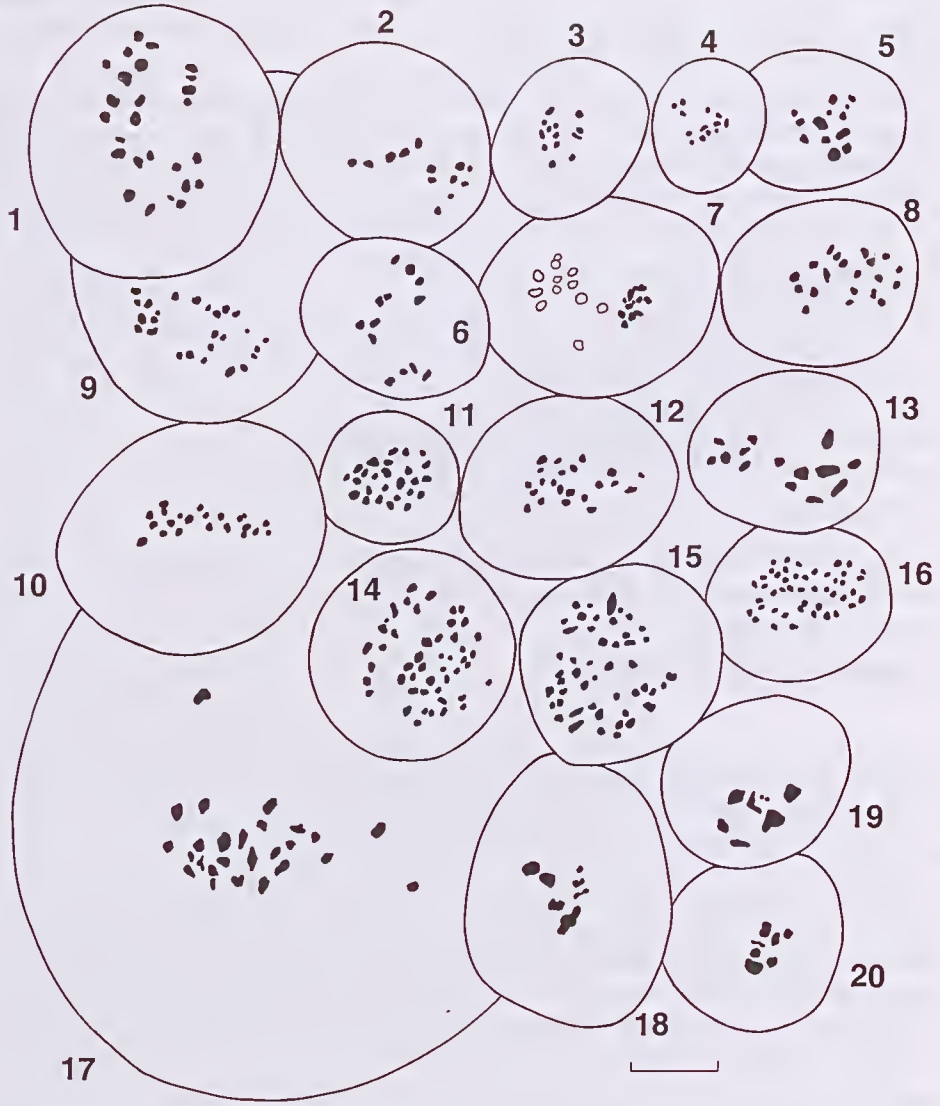

Fig. 6: 1–20. Chromosome numbers in Australian mosses (figures at metaphase 1 of meiosis unless stated otherwise) — in family Pottiaceae. 1. *Aloina aloides* var. *ambigua* (*27/83*) n=26; 2. *Bryocrythrophyllum dubium* (*57/83*) n=13; 3–5 *Barbula calycina*: 3. (*40/83*) n=13; 4. (*43/83*) n=13; 5. (*29/79*) n=13; 6 & 7. *Tortella knightii* (*20/84*): 6. n=13; 7. Anaphase 1; 8. *Tortella knightii* (*18/87*) n=20; 9. *Tortula truncata* (*12/77*) n=26; 10. *Tortula atrovirens* (*48/84*) n=21; 11.*Tortula antarctica* (*35/84*) n=26; 12 & 13. *Tortula andersonii* (*46/82*, *46/82a*): 12. n=22; 13. n=14; 14–16. *Tortula muralis*: 14. (*28/73*) n=48; 15. (*30/79*) n=48; 16. (*13/77*) n=48; 17. *Tetrapterum cylindricum* (*23/81*) n=26; 18–20. *Tortula papillosa*: 18. (*25/81*) n=7 note the m-bivalent; 19. (*42/82*) n=7; m-bivalent separating; 20. (*58/82*) n=7. Scale bar is 10 μm.

chromosome numbers, n=14 and n=22, have been recorded for *T. andersonii* (*46/82*, *46a/82*) from the Yarrangobilly Caves area.

60. Tortula antarctica (Hampe) Wilson n=26 Fig. 6.11

The chromosome number reported here for *T. antarctica* is n=26 (Table 1) for two collections, from widely separate localities: - one (*35/84*) from Port Macdonald in South Australia, the other (*16/87*) from Jenolan Caves, New South Wales, are the first Australian records for this species.

61. Tortula atrovirens (Sm.) Lindb. n=21 Fig. 6.10

Previous chromosome counts for *T. atrovirens* (as *Desmatodon convolutus* (Brid.) Grout) in Europe are n=26 and for other species in North America and Europe n=13, 26, 39 and 52 (Fritsch 1991). The number reported here, the first for Australia (*48/84*) is n=21 from Culcairn in New SouthWales.

62. Tortula muralis Hedw. n=48 Figs 6.14–6.16
n=24 no illustration

The species *T. muralis* is variable and cosmopolitan. Various chromosome numbers, n=14, 24, 26, 48, 52, 66, have been recorded for *T. muralis* in the northern hemisphere (Fritsch 1991), with n=48 for Australian populations. (Ramsay 1983c: fig 39, photomicrograph). Five additional collections (*28/73*, *13/77*, *21/77*, *30/79*, *3/91*) from various locations in Victoria and New South Wales all have the chromosome number n=48 while two separate collections from Echo Point, New South Wales had different numbers: n=48 (*28/73*) and n=24 (*25/73*).

63. Tortula papillosa Wilson n=7 (6+m) Figs 6.18–6.20

Previous chromosome numbers recorded for *Tortula papillosa* are n=7 (6+m), 12 (Ramsay 1967, 1974). In these studies the number n=7 is recorded for three additional populations (*25/81*, *42/82*, *58/82*) (Table 1) from New South Wales.

64. Tortula truncata (Hedw) Mitt. n=26 Fig. 6.9

This species was formerly known as *Pottia truncata* but was reassigned to *Tortula* by Zander (1977). The numbers n=20, 25, 26, 52 have been reported in Fritsch (1991) from Europe for *Pottia truncata*. The collection studied here (*12/77*) has a count of n=26 and is the first chromosome report for this species from Australia.

65. Weissia brachycarpa (Nees & Hornsch.) Jur. n=12 Fig. 7.4

Weissia brachycarpa differs from *W. controversa* in having broad, plane-margined leaves and is gymnostomous.The collection studied (*42/83*), with a count of n=12, is the first chromosome number record for *W. brachycarpa.*

66. Weissia controversa Hedw. n=13 Figs 7.5–7.7

Previous information on *Weisia controversa* (Ramsay 1974) provided the chromosome number n=13 which is confirmed here for an additional three collections (*5/74*, *9/76*, *13/84*) all from New South Wales (Table 1).

Ptychomniaceae

The current concept of Ptychomniaceae(Buck & Goffinet 2000, Goffinet & Buck 2004) includes 10 genera. Of these, the following six are present in Australia- *Ptychomnion, Euptychium, Garovaglia, Glyphothecium, Hampeella, Tetraphidopsis.* All,

except *Euptychium* and *Garovaglia* which are tropical to subtropical in distribution, are temperate taxa. Chromosome numbers are now available for all genera except *Tetraphidopsis*. The genera *Ptychomnion* and *Glyphothecium* have a count of n=7 (Ramsay 1967a, 1974) and n=7 has also been reported recently for two other genera in this family from New Zealand that are not present in Australia, *Cladomnion* and *Dichelodontium* (Ramsay 2009). Other published data give different numbers:, e.g. *Garovaglia* n=10 for two species in Papua New Guinea (Ramsay 2008) and n=10 for *Euptychium robustum* on Lord Howe Island (Ramsay 1992). *Garovaglia* and *Euptychium* were formerly in the family Garovagliaceae. Here chromosome numbers are published for the first time for *Hampeella*, *Euptychium* and *Garovaglia* for mainland Australia.

67. Euptychium cuspidatum (Mitt.) Mitt. n=5 Fig. 4.3

There are four species of *Euptychium* listed in Streimann & Klazenga (2002) for Australia, of which two species are present only on Lord Howe Island, one of which, *E. robustum* has n=10 (Ramsay 1992). The collection studied here (*6/75*) from Coffs Harbour, New South Wales had the chromosome number n=5. This is half the number published for *E. robustum* and may represent the basic number for the genus.

68. Garovaglia elegans (Dozy & Molk.)Hampe ex Bosch & Sande Lac. subsp. *dietrichiae* (Müll.Hal.) During n=10 Fig.4.2

In Australia, two species of *Garovaglia* are recognised (Streimann & Klazenga 2002), occurring only in the rainforests of northeastern Queensland and northern New South Wales. The collection of *G. elegans* subsp. *dietrichi*ae studied here (*11/84*) from Atherton, Queensland had the chromosome number n=10 which corresponds to that for two other species examined in Papua New Guinea (Ramsay 2008).

The genus *Glyphothecium* is distributed in Southeast Asia and New Zealand as well as temperate eastern States in Australia.

69. Glyphothecium sciuroides (Hook.) Hampe n=7 no illustration

Previously, the chromosome number n=7 for *Glyphothecium sciuroides* was obtained for Australian specimens by Ramsay (1967a) and illustrated in Ramsay (1974) as well as for New Zealand (Ramsay 2009). The collection studied here from New SouthWales (*50/84*) confirms the number as n=7.

70. Hampeella pallens (Sande Lac.) M.Fleisch. n=6 Figs 7.8–7.10
n=12 Fig.7.11

The genus *Hampeella*, is an epiphytic moss with two species distributed in eastern Australia and New Zealand. Scott & Stone (1976) describe *H. pallens* noting that sporophytes are present in Queensland specimens but rare in New South Wales. However, in the collections studied here from New South Wales and in others we have found, sporophytes are fairly common, e.g. from the Blue Mountains. The specimens studied here were from northern New South Wales and the Queensland/New South Wales border area.

These are the first chromosome number reports for *Hampeella*. In three populations studied (*33/81*, *50/83*, *60/84*) the chromosome number was n=6 while another population (*49/83*) had the chromosome number n=12 representing a polyploid based on n=6.

A single species of *Ptychomnium* occurs in Australia, including Lord Howe Island, as well as New Zealand. A second species is present on Macquarie Island and New Zealand.

71. Ptychomnium aciculare (Brid) Mitt. n=7 Fig. 7.12

The chromosome number n=7 was found in all specimens of *Ptychomnion aciculare* examined for mainland Australia, Lord Howe Island and New Zealand (Ramsay 1974, 1992, 2009). This is the first chromosome number report from Tasmania (*59/81*; n=7) and agrees with former counts. Two additional counts from mainland Australia examined here also had the chromosome number n=7.

Racopilaceae

The Racopilaceae is a small family with only two genera *Powellia* and *Racopilum*, both being represented in Australia (Zanten 2006a, b). There are no chromosome records for *Powellia*, but for *Racopilum* the numbers n=10, 20 and 21 are recorded (Fritsch 1991). Of these n=10 is most frequent and has been reported for R. *convolutaceum* (=*R. cuspidigerum* var *convolutaceum*) in Australia, *R. cuspidigerum* from Borneo, of *R. spectabile* from Papua New Guinea (Ramsay 2008), *R. capense* from Tanzania, and *R. strumiferum* in New Zealand (de Vries et al. 1989). *Racopilum tomentosum* from South America (de Vries et al.1989) is a polyploid species with n=20, as is *R. aristatum* from Japan (Fritsch 1991) with n=21.

72. Racopilum cuspidigerum (Schwägr.) Aongstr. var. ***convolutaceum*** (Müll.Hal) Zanten & Dijkstra n=10 Figs 7.18 & 7.19

All Australian collections examined here belong to *R. cuspidigerum* var. *convolutaceum* (*12/75*, *11/76*, *33/79*, *46/83*) and have the chromosome number n=10, supporting the previously published records for Australia.

Rhizogoniaceae

The family Rhizogoniaceae as recognised by Goffinet & Buck (2004) contains seven genera of which *Goniobryum, Hymenodon, Leptotheca, Mesochaete, Pyrrhobryum* and *Rhizogonium* are present in Australia. There are no chromosome data yet for *Goniobryum* or *Hymenodon*. Chromosome numbers already recorded for the family in Australia are n=10 and n=20 for *Leptotheca ganchaudii*; n=10 for *Mesochaete undulata;* n=5 for one species of *Rhizogonium* and n=6 and n=12 for two different species of *Pyrrhobrynm* (Ramsay 1967a, 1974, 1982, 1983b, c). Some recent information is also available for *Pyrrhobryum spiniforme* n=12, for Papua New Guinea (Ramsay 2008) and for *Cryptopodium bartramioides* n=7 in New Zealand (Ramsay 2009).

73. Mesochaete undulata Lindb. n=10 Fig. 7.21

The chromosome number n=10 recorded by Ramsay (1967a, 1974) is supported in the recent studies for a collection (*36/83*) from Woolgoolga, New South Wales.

The subgenus *Pyrrhobryum* in the genus *Rhizogonium* was raised to generic level by Manuel (1981). In Australia *Pyrrhobryum* contains six species including the new species record *P. latifolium* while the genus *Rhizogonium* was reduced to four species by Gilmore (2006). Known chromosome numbers for species in Australia are n=6 and/or n=12 for several species of *Pyrrhobryum* (Ramsay 1966, 1967a, 1974, 1983c; as *Rhizogonium*), and n=5 for *Rhizogonium novaehollandiae* (Ramsay 1967a, 1974). The chromosome number n=12 has been reported for *Pyrrhobryum spiniforme* (Hedw)

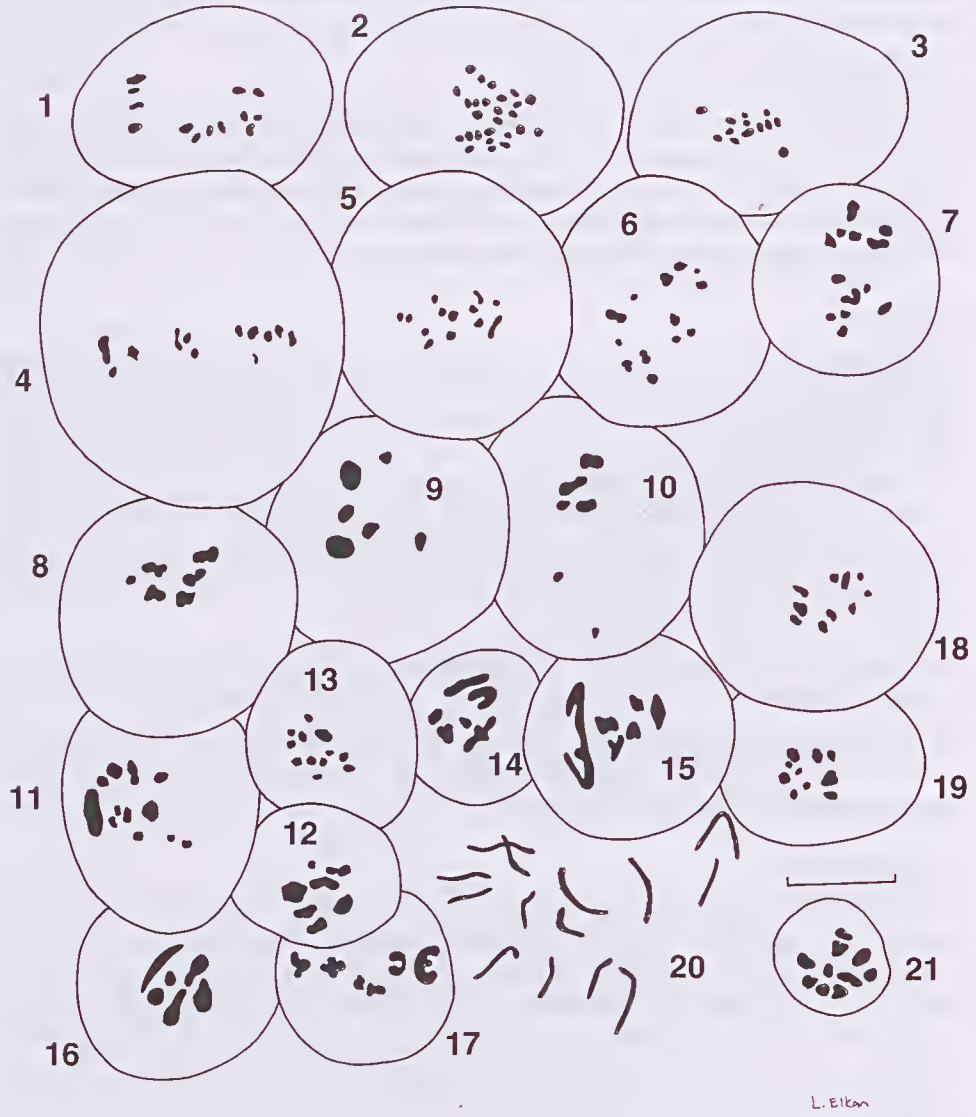

Fig. 7: 1–21. Chromosome numbers in Australian mosses (figures at metaphase 1 of meiosis unless stated otherwise) — in families Grimmiaceae, Pottiaceae (contd), Ptychomniaceae (part), Rhizogoniaceae, Racopilaceae, Mniaceae. 1. *Grimmia trichophylla* (*17/84*) n=13; 2. *Grimmia pulvinata* var. *africana* (*21/73*) n=26; 3. *Schistidium apocarpum* (*49/82*) n=13; 4. *Weissia brachycarpa* (*42/83*) n=12; 5–7. *Weissia controversa*; 5. (*13/84*) n=13; 6.(*5/74*) n=13; 7. (*9/76*) n=13; 8–11. *Hampeella pallens*: 8. (*33/81*) n=6; 9. (*60/84*) n=6; 10. (*50/83*) n=6; 11. (*49/83*) n=12; 12. *Ptychomnion aciculare* (*59/81*) n=7; 13. *Pyrrhobryum mnioides* (*18/77*) n=12; 14 & 15. *Pyrrhobryum paramatteuse*; 14. (*2/82*) n=6; 15. (*16/81*) n=6, note the large bivalent separating with unequal sized half bivalents; 16. *Rhizogonium novaehollandiae* (*71/64*) n=5; 17. *Pyrrhobryum medium* (*8/82*) n=6; 18 & 19. *Racopilum strumiferum var. convolutaceum*: 18. (*3/86*) n=10; 19. (*33/79*) n=10; 20. *Plagiomnium novae-zeelandiae* (*4/88*) n=14, gametophytic mitotic metaphase. 21. *Mesochaete undulata* (*36/83*) n=10. Scale bar is 10 µm.

Mitt. from Japan, USA, Papua New Guinea (Fritsch 1991, Ramsay 2008) while n=6 is recorded from Japan and Puerto Rico. Although *P. spiniforme* occurs in Australia, no number is yet available for Australian collections.

Photomicrographs and a more detailed analysis of heteropycnosis, meiosis and mitotic chromosomes as karyotypes for *Pyrrhobryum* (as *Rhizogonium*) appear and are discussed in Ramsay (1974, 1982, 1983c) with locality data given for early collections in Ramsay (1967a) and for later collections here in Table 1.

74. Pyrrhobryum medium (Besch) Manuel n=6 Fig. 7.17

This species has a tropical distribution in Borneo, Papua New Guinea and the Pacific east to French Polynesia and in Australia occurs in northeastern Queensland (Gilmore 2006). The chromosome number for *Pyrrhobryum medium* (*1/64*) (as *Rhizogonium brevifolium*) was first recorded by Ramsay (1966, 1967a, 1974) with photomicrographs of meiotic figures (Ramsay 1966) and as figs 30–31 in Ramsay (1983c). Premeiotic chromosome studies appear in Ramsay (1966) and as karyotype figures in Ramsay (1982).

75. Pyrrhobryum mnioides (Hook.) Manuel n=12 Fig. 7.13

Streimann & Klazenga (2002) list this species in Australia as *P. mnioides* subsp. *contortum* (Wilson) Fife based on a revision by Fife (1995: 315) but this is not followed in Gilmore (2006: 362 who indicates no subspecies and does not quote Fife). The distribution of this species is southern temperate eastern Australia from New South Wales south to Tasmania and also on Macquarie Island extending across to New Zealand and South America.

Two separate collections of *Pyrrhobryum mnioides* were studied here (*16/77*, *18/77*) both from Victoria with the chromosome number n=12. A photomicrograph of metaphase 1 of meiosis appears in Ramsay (1983c: fig 106).

76. Pyrrhobryum paramattense (Müll.Hal.) Manuel n=6 Figs 7.14 & 7.15

Pyrrhobryum paramattense is distributed south from eastern coastal Queensland to New South Wales and Victoria and Tasmania. It also occurs on Norfolk Island (Streimann 2002) and in New Zealand (Beever et al. 1992). The chromosome number for *Pyrrhobryum* (as *Rhizogonium) paramattense* was recorded from meiotic and mitotic studies in Ramsay (1966) for five collections from Royal National Park, New South Wales (Ramsay 1967a, 1974). Here it is confirmed for an additional five collections (*2/72*, *11/75*, *16/81*, *17/81*, *8/82*) based on meiotic studies from different localities in northern New South Wales and Victoria and from mitotic examination of the karyotype (*12/79*) from Victoria. Photomicrographs appear in Ramsay (1966, 1983c: figs 22–25) showing the heteropycnotic structures at prophase 1 and illustrate the appearance of bivalents and their behaviour at metaphase 1 and anaphase 1. The additional collections examined here all had the chromosome number n=6.

77. Rhizogonium novaehollandiae (Brid.) Brid. n=5 Fig. 7.16

One of the four *Rhizogonium* species found in Australia (Gilmore 2006), *R. novaehollandiae,* has been examined cytologically with the chromosome number n=5 (Ramsay 1967a, 1974, 1983c) for a population from Tasmania (*71/64*) (Table 1). The chromosome number for *R. novaehollandiae* is illustrated by photomicrographs in Ramsay (1966, 1983c: figs 30 & 31). Drawings at metaphase 1 are included here.

Family Sematophyllaceae

The first chromosome counts published for Sematophyllaceae in Australia are n=11, 11(10+m) and 22 for *Rhaphidorrhynchium amoenum* (Ramsay 1967a, 1974), while other counts for *Wijkia extenuata* n=11, *Sematophyllum subhumile* n=11, and *Sematophyllum subpinnatum* n=10, appear in Ramsay et al. (2002). The genus *Wijkia* has been transferred to the new family Pylasiadelphaceae (Goffinet & Buck 2004), accepted by the above authors for the *Flora of Australia* 52A, Mosses 2 (in press). Other chromosome numbers (non Australian) have been reported for *Sematophyllum* n=10+m in USA; *Brotherella* n=6, 7, 8, 10, 9+2m in India, China, U.S.A and *Trichosteleum* n=11 in Vanuatu (see Fritsch 1991; Goldblatt & Johnson 1998).

The genus *Radulina* is a tropical moss widespread from India through Malesia to northern tropical Australia and Hawaii. The species recorded for Australia by Ramsay & Cairns (2004) and Ramsay et al. (2004) as *Radulina hamata* Dozy & Molk, has been synonymised with *Radulina borbonica* by O'Shea (2006).

78. Radulina borbonica (Bél.) W.R.Buck n=6 Fig. 4.11

This is the first chromosome count for the genus *Radulina*. The number n=6 is reported for a collection (*9/84*) made by Heinar Streimann in North Queensland, this being the lowest number for Sematophyllaceae in Australia, but n=6 is present in *Brotherella*, a northern hemisphere genus.

Family Thuidiaceae

The Thuidiaceae contains eight genera of well known pleurocarpous mosses of which *Pelekenium*, *Thuidiopsis* and *Thuidium* are known for Australia (Touw & Falter-van den Haak 1989). Chromosome data include n=11 for *Pelekenium* from India, n=10, 11 for *Thuidium* species from India, Japan, Europe, USA (Fritsch 1991, de Vries et al. 1989) and n=11, 22 for *Thuidiopsis sparsa* (as *Thuidium furfurosum*) from Australia (Ramsay 1967a, 1974).

79. Thuidiopsis sparsa (Hook.f. & Wilson) Broth. n=11 no illustration

The chromosome number recorded here for additional populations of *Thuidiopsis sparsa*, all from different areas in New South Wales: Katoomba (*2/75*), Macquarie University grounds in Sydney (*2/91*) and Mt Warning (*32/84*) is n=11 and confirms that found previously.

Family Trachylomataceae

The genus *Braithwaitea* was transferred from the family Hypnodendraceae to the Trachylomataceae by Buck & Goffinet (2004). The chromosome number n=10 was reported previously for *B. sulcata* in Australia by Ramsay (1983c, 1987).

80. Braithwaitea sulcata.(Hook.) Lindb. in A.Jaeger. n=10 Fig. 7.21

This report for *Braithwaitea sulcata* from an additional locality (*47/82*) confirms the chromosome number as n=10.

Discussion

There is a general consensus that studies of cytology of mosses, particularly concentrating on chromosome numbers and karyotype analysis, are significant in reflecting phylogeny, although there remain differences of opinion on interpretation (Newton 1984b). In a relatively recent study Przywara & Kuta (1995) have summarised cytological studies on bryophytes worldwide up until the mid 1990s. Their analyses encompass variation in chromosome numbers, distribution of cytotypes, basic chromosome numbers, the extent of polyploidy, aneuploidy, the distribution and frequency of m-chromosomes, intraspecific variability and geography with many comparative tables provided. In mosses, chromosome numbers vary from n=4 to 72 and it has been estimated that chromosome data are available for about 15% of mosses worldwide. At that time (1994) data were still unavailable for about 20 moss families, 442 genera and innumerable species.

Of particular interest among the new reports in these investigations are the chromosome number of n=6 for *Ceratodon purpureus* with a possible dimorphic bivalent, n=6 for *Leucobryum aduncum* var. *scalare*, and n=4 for an additional species of *Hypnodendron*, an Australian tropical endemic, *H. comatulum*. The first published chromosome number records are given for the genera *Calymperes* n=10, *Eccremidium* n=13, *Hampeella* n=6 & n=12, *Hedwigidium* n=11, *Tetrapterum* n=26 and *Radulina* n=6. First records are given here for Australian species in the genera *Aloina*, *Bryoerythrophyllum*, *Cryphaea*, *Dendrocryphaea*, *Encalypta*, *Grimmia*, *Gymnostomum*, *Hedwigia*, *Plagiomnium*, *Schistidium* and *Trematodon*. For species not previously studied the following chromosome numbers are reported: *Breutelia pseudophilonotis* n=6, *Entosthodon subnudus* var. *gracilis* n=26 & n=52, *Euptychium cuspidatum* n=5, *Garovaglia elegans* subsp. *dietrichiae* n=10, *Grimmia pulvinata* var. *africana* n=26, *Hypnodrendron comatulum n=4*, *Leptostomum erectum* n=6 & n=12, *Philonotis tenuis* n=6, *Rhynchostegium muricatulum* n=11 & n=22, *Tortella knightii* n=13 & n=20, *Tortula andersonii* n=22, *Tortula antarctica* n=*26*, *Tortula atrovirens* n=21, *Weissia brachycarpa* n=13 (Table 1).

More recently, molecular studies such as electrophoretic enzyme methods allow genetic polymorphisms to be revealed in populations or confirm hybridisation or polyploid origins. Such analyses based on nuclear DNA and comparisons of mitochondrial and chloroplast genomes are adding more information for cytogenetic and phylogenetic research in mosses (Vitt et al.1998, Goffinet et al. 2004). It is possible that molecular together with cytological studies will prove valuable information for a variety of investigations such as those in progress on *Sphagnum* (Shaw pers. comm.).

Chromosome studies both at meiosis (chromosome numbers, heterochromatin during prophase, its distribution on the individual chromosomes, meiotic behaviour such as pairing and chiasma formation and various specialised chromosomes and erratic behaviour) and at mitosis (karyotype comparisons, heterochromatin banding, distinguishing between autopolyploidy and allopolyploidy and the origin of aneuploidy within complements) continue to provide important information on origins and significance of evolutionary processes in mosses (Newton 1984b). Cytogenetic studies can provide analyses of possible sex determining chromosomes, either structural or morphological (Ramsay 1983c), provide data for the cytogeographical occurrences and indicate the importance of polyploidy and aneuploidy in both the evolution and

distribution of mosses (Newton 1979, 1984b; Przywara & Kuta 1995). Cytological differences, either numerical or structural between taxa or even within populations, can indicate and eventually provide information on the phylogeny of mosses. Differential staining methods such as Geimsa c-banding analyses which differentiate the distribution of euchromatin and heterochromatin (facultative and constitutive) within the karyotype for the cytogenetics of mosses has been clearly demonstrated by Newton (1977, 1983a, 1984a, b, 1985, 1986).These methods have great taxonomic potential but have been carried out rarely on mosses. No such data are yet available for any Australian moss.

There is still much to be investigated. In spite of the large volume of data available for the mosses in the northern hemisphere, where most of the research work has been undertaken so far, more than 80% species there have yet to be checked. Even with the additional chromosome data presented here, the available information for mosses in Australia still covers no more than 15 % of total species here, so there is a need for continuing cytological studies in this continent. The almost complete absence of chromosome studies of mosses in other regions of the southern hemisphere such as the continents of Africa and Central and South America as well as Pacific Island Territories, where some interesting and unusual mosses occur, certainly calls for further investigation.

Acknowledgments

The author is particularly indebted to Ben van Zanten, Heinar Streimann, Wilf Schofield and Alison Downing for collecting specimens with capsules at a suitable stage for study. Alison Downing provided assistance in the field and helped with identifications, particularly of Pottiaceae, as well as helping to check the manuscript data. Rod Seppelt determined species in the Ditrichaceae and Dicranaceae, particularly *Ditrichum*, *Ceratodon* and *Dicranella*. Chromosome pencil drawings, prepared by the author, have been inked in by Catherine Wardrop or Lesley Elkan. Most of the studies were carried out over a long period while the author was on the staff at the University of New South Wales, then subsequently as an Honorary Associate at Macquarie University and an Honorary Research Associate at the Royal Botanic Gardens, Sydney.

References

Anderson LE & Bryan VS (1958) Chromosome numbers in mosses of eastern North America *Elisha Mitchell Scientific Society* 74: 173–199.

Anderson LE & Bryan VS (1987) M-chromosome behaviour in the moss, *Clastobryum parvulus*. *Memoirs of the New York Botanical Garden* 45: 122–134.

Anderson LE & Crum H (1981) *Mosses of Eastern North America* vol. 1: 153–164. (Columbia University Press, New York)

Beever J, Allison KW & Child J(1992) *The Mosses of New Zealand*. (University of Otago Press, Otago)

Buck WR (1994) A new attempt at understanding the Meteoriaceae. *Journal of the Hattori Botanical Laboratory* 75: 51–72.

Buck WR, Burley JS & Pritchard NM (1990) Revision of the genus *Ceratodon* (Bryophyta). *Harvard Papers in Botany* 2: 17–76.

Buck WR & Goffinet B (2000) Morphology and classification of mosses. Pp. 71–123 in Shaw AJ & Goffinet B (eds) *Bryophyte Biology*. (Cambridge University Press, Cambridge)

Catcheside DG (1980) *Mosses of South Australia.* (Government Printer, Adelaide)
Catcheside DG & Stone IG (1988) Mosses of the Northern Territory, Australia. *Journal of the Adelaide Botanical Garden* 11: 1–17.
Eddy A (1988) *A Handbook of Malesian Mosses Vol 1 Sphagnales to Dicranales.* (British Museum (Natural History, London)
Enroth J (1995) Taxonomy of *Cyptodon,* with notes on *Dendrocryphaea* and selected Australasian species of Cryphaeaceae (Musci). *Fragmenta Geobotanica* 40: 133–152.
Enroth J (1996) Amendments to Australasian *Cryphaea* (Cryphaeaceae, Bryopsida). *Annales Botanici Fennici* 33: 39–44.
Fife AJ (1985) A generic revision of the Funariaceae (Bryophyta, Musci) Part 1. *Journal of the Hattori Botanical Laboratory* 58: 149–156.
Fife AJ (1995) Checklist of the mosses of New Zealand. *Bryologist* 98: 313–337.
Fife AJ & Seppelt RD (2001) A revision of the family Funariaceae (Musci) in Australia. *Hikobia* 13: 473–490.
Fritsch R (1991) Index to Bryophyte chromosome counts. *Bryophytorum Bibliotheca* 40: 1–352.
Gangulee HC (1969) *Mosses of Eastern India and adjacent regions,* vol 1: 218–233 (Calcutta)
Gilmore SR (2006) *Bartramiaceae.* Pp. 248–270 in McCarthy P (ed.) Flora of Australia vol 52, Mosses 1. (Australian Biological Resource Study, Canberra)
Goffinet B & Buck WR (2004) Systematics of the Bryophyta (mosses): from molecules to a revised classification. In Goffinet B, Hollowell V & Magill RE (eds) Molecular Systematics of Bryophytes. *Monographs in Systematic Botany from the Missouri Botanical Garden* 98: 205–239.
Goffinet B, Buck WR & Shaw AJ (2008) Morphology and Classification of the Bryophyta. Pp. 55–138 in Goffinet B & Shaw AJ (eds) *Bryophyte Biology* (2nd edition). (Cambridge University Press, Cambridge)
Goldblatt P & Johnson DE (eds) 1994 *Index to Plant chromosome numbers 1990-1991.* Monographs in Systematic Botany Missouri Botanical Garden 51: 3–12.
Goldblatt P & Johnson DE (eds) 1996 *Index to Plant chromosome numbers 1992-1993.* Monographs in Systematic Botany Missouri Botanical Garden 58: 6–12.
Goldblatt P & Johnson DE (eds) 1998 *Index to Plant chromosome numbers 1994-1995.* Monographs in Systematic Botany Missouri Botanical Garden 69: 3–6.
Goldblatt P & Johnson DE (eds) 2000 *Index to Plant chromosome numbers 1996-1997.* Monographs in Systematic Botany Missouri Botanical Garden 81: 2–5.
Goldblatt P & Johnson DE (eds) 2003 *Index to Plant chromosome numbers 1998-2000.* Monographs in Systematic Botany Missouri Botanical Garden 94: 3–7.
Goldblatt P & Johnson DE (eds) 2006 *Index to Plant chromosome numbers 2001-2003.* Monographs in Systematic Botany Missouri Botanical Garden 106: 5–8.
Jachimsky H (1935) Beitrag zur Kenntnis von Geschlecht chromosomen und heterochromatin bei moosen. *Jahrbeit Wissneschaften Botanique* 81: 203–283.
Jolley H & Milne J (2007) Two odd mosses: The common *Stonea oleaginosa* (I.G.Stone) R.H.Zander and the rare *Phascopsis rubicunda* I.G.Stone. Abstract for poster: *World Conference of Bryology: Biology in Asia in the New Millenium:* 97.
Klazenga N (2003) A revision of the Australasian species of *Dicranoloma* (Bryophyta, Dicranaceae). *Australian Systematic Botany* 16: 427–471.
Klos J, Kuta E & Przywara L (2001) Karyology of *Plagiomnium.* 1. *Plagiomnium affine* (Schrad.) T. Kop. *Journal of Bryology* 23: 9–16.
Kruijer JD (2002) Hypopterygiaceae of the world. *Blumea supplement* 13: 1–388.
Kruijer JD (2006) Hypopterygiaceae. Pp. 377–388 in McCarthy PM (ed.) *Flora of Australia,* vol. 52 *Mosses* 1. (Australian Biological Resources Study, Canberra)
Kuta ER, Ochyra R & Przywara L (1990) Chromosome studies on Polish Bryophytes V. *Polish Botanical Studies* 1: 127–147.
Kuta E, R Ochyra & L. Przywara (1995) Chromosome studies on Polish Bryophytes VII. *Fragmenta Floristica et Geobotanica* 40: 453–470.

McDaniel SF & Shaw AJ (2005) Selective sweeps and intercontinental migration in the cosmopolitan moss *Ceratodon purpureus* (Hedw.) Brid. *Molecular Ecology* 14: 1121–1132.
McCarthy P (2006) (ed.) *Flora of Australia*, vol 52 *Mosses* 1. (Australian Biological Resources Study, Canberra)
Magill RE (1981) *Flora of Southern Africa Bryophyta Part 1. Mosses. Fascicle 1. Sphagnaceae-Grimmiaceae.* (Botanical Research Institute, Department of Agriculture and Fisheries, Republic of South Africa)
Manuel M (1981) Synopsis of the Rhizogoniaceae Broth. in Malaya. *Cryptogamie Bryologie Lichénologie* 2: 449–455.
Mehra PN & Khanna AL (1961) Recent cytological investigations in mosses. *Research Bulletin Punjab University* 12: 1–29.
Newton ME (1973) Chromosome studies on some New Zealand and Jamaican bryophytes. *Journal of Bryology* 7: 399–403.
Newton ME (1977) Chromosomal relationships and heterochromatin bodies in a moss *Dicranum tauricum* Sapehin. *Journal of Bryology* 9: 557–564.
Newton ME (1979) Chromosome morphology and bryophyte systematics. Pp. 207–229 in Clarke GCS & Duckett JG (eds) *Bryophyte Systematics.* (Academic Press, London)
Newton ME (1983a) Numerical uniformity and structural variation of moss chromosomes. *Journal of Bryology* 12: 587–594.
Newton ME (1983b) Notes on sex determination in bryophytes. *Journal of the Hattori Botanical Laboratory* 54: 555–556.
Newton, ME (1984a) Questions of procedure in moss cytotaxonomy: new data from British mosses. *Journal of Bryology* 13: 263–268.
Newton ME (1984b) The cytogenetics of bryophytes. Pp 65–96 in Dyer AF & Duckett JG (eds) *The Experimental Biology of Bryophytes.* (Academic Press, London)
Newton ME (1985) Chromosome banding in bryophytes. *Bryological Times* 13:1, 4–5.
Newton ME (1986) Bryophyte phylogeny in terms of chromosome cytology. *Journal of Bryology* 14(2): 215–130.
Norris D & Koponen T (1990) Bryophyte Flora of the Huon Peninsula, Papua New Guinea XXXV. Dicranaceae and Dicnemonaceae (Musci) *Acta Botanica Fennica* 139: 1–64.
O'Shea B (2006) A revision of the genus *Radulina* WR Buck & BC Tan (Sematophyllaceae, Bryopsida) *Tropical Bryology* 27: 25–43.
Przywara L, Ochyra R & Kuta E 1983 (1984) Chromosome studies on Polish bryophytes II. *Lindbergia* 9(3): 178–185.
Przywara L & Kuta E (1995) Karyology of Bryophytes. *Polish Botanical Studies* 9: 1–83.
Ramsay HP (1964) The chromosomes of *Dawsonia*. *The Bryologist* 67: 153–162.
Ramsay HP (1966a) Sex chromosomes in *Macromitrium*. *The Bryologist* 69: 293–311.
Ramsay HP (1966b) Cytological studies on Australian mosses. Ph D Thesis. University of Sydney, Australia.
Ramsay HP (1967a) Chromosome numbers. In Löve A, IOPB chromosome reports XIV. *Taxon* 16: 552–571.
Ramsay HP (1967b) Intraspecific polyploidy in *Hypopterygium rotulatum* (Hedw.) Brid.. *Proceedings of the Linnaen Society of New South Wales* 9: 221–230.
Ramsay HP (1969) Cytological studies on some mosses from the British Isles. *Botanical Journal of the Linnean Society* 62: 85–121.
Ramsay HP (1973) Unusual sporocytes in *Dicnemoloma pallidum*. *The Bryologist:* 76: 178–182.
Ramsay HP (1974) Cytological studies on Australian mosses. *Australian Journal of Botany* 22: 293–348.
Ramsay HP (1977) Chromosome numbers in some mosses from Western Australia. *Journal of Bryology* 9: 343–347.
Ramsay HP (1979) Anisospory and Sexual Dimorphism in the Musci. Pp. 281–316 in Clarke, GCS & Duckett JG (eds) *Bryophyte Systematics*. Systematics Association special volume 14. (Academic Press, London)

Ramsay HP (1982) The value of karyotype analysis in the study of mosses. *Journal of the Hattori Botanical Laboratory* 53: 51–71.

Ramsay HP (1983a) A moss with four chromosomes. *Lindbergia* 9: 89–92.

Ramsay HP (1983b) Chromosome numbers in some mosses from western Canada. *Canadian Journal of Botany* 61(9): 2384–2387.

Ramsay HP (1983c) Cytology of mosses. Pp. 149–221 in Schuster RM (ed.) *New Manual of Bryology*. (Hattori Botanical Laboratory, Nichinan)

Ramsay HP (1985) Cytological and sexual characteristics of the moss *Dicranoloma*. In Crosby MR (ed.) Studies in Systematic Botany dedicated to Lewis Anderson. *Monographs in Systematic Botany from the Missouri Botanical Garden* 2: 93–110.

Ramsay HP (1987) Cytological and other studies on the Hypnodendraceae. *Memoirs New York Botanical Garden* 45: 135–153.

Ramsay HP (1988) Cytological and biosystematic studies on some Australasian mosses. *Journal of the Hattori Botanical Laboratory* 64: 177–186.

Ramsay HP (1992) Chromosome studies on some mosses from Lord Howe Island. *Nova Hedwigia* 54: 37–43.

Ramsay HP (1993) Chromosome studies on some Australasian Orthotrichaceae II. *Ulota* and *Zygodon* with additional studies on *Orthotrichum*, *Schlotheimia* and *Macromitrium*. *Journal of the Hattori Botanical Laboratory* 74: 183–192.

Ramsay HP (1997) Cytotaxonomic studies on some Polytrichales from Australia, New Zealand, Papua New Guinea and Vanuatu. *Journal of the Hattori Botanical Laboratory* 82: 213–226.

Ramsay HP (2006) Chromosome numbers in some species of *Dicranoloma* from Australia, New Zealand and Papua New Guinea. *Telopea* 11: 308–313.

Ramsay HP (2008) Chromosome numbers in various mosses from Papua New Guinea. *Tropical Bryology* 29: 41–47.

Ramsay HP (2009) Chromosome numbers in mosses from New Zealand. *Telopea* 12: 425–438.

Ramsay HP & Berrie GK (1982) Sex determination in Bryophytes. *Journal of the Hattori Botanical Laboratory* 52: 255–274.

Ramsay HP & Cairns A (2004) Habitat, distribution and phytogeographical affinities of mosses in the Wet Tropic bioregion, north-east Queensland. *Cunninghamia* 8: 371–408.

Ramsay HP & Lewinsky J (1984) Chromosome studies on some Australasian Orthotrichaceae (Musci) 1. *Orthotrichum*. *New Zealand Journal of Botany* 22: 346–351.

Ramsay HP & Bergstrom D (1995) Chromosome numbers for three mosses from Macquarie Island. *The Bryologist* 98: 359–362.

Ramsay HP & Schofield WB (1981a) Observations on the cytology of mosses endemic to western North America which occur in British Columbia. *Journal of the Hattori Botanical Laboratory* 49: 279–304.

Ramsay HP & Schofield WB (1981b) Chromosome numbers in some mosses from Northwestern North America. *Journal of the Hattori Botanical Laboratory* 49: 319–334.

Ramsay HP & Spence JR (1996) Chromosome data on Australian Bryaceae. *Journal of the Hattori Botanical Laboratory* 80: 251–270.

Ramsay HP, Schofield WB & Tan BC (2002) The family Sematophyllaceae (Bryopsida) in Australia part 1. *Wijkia*, *Acanthorrhynchium*, *Trismegistia* and *Sematophyllum*. *Journal of the Hattori Botanical Laboratory* 92: 1–50.

Ramsay HP, Schofield WB & Tan BC (2004) The family Sematophyllaceae (Bryopsida) in Australia part 2. *Acroporium*, *Clastobryum*, *Macrohymenium*, *Meiotheciella*, *Meiothecium*, *Papillidiopsis*, *Radulina*, *Rhaphidorrhynchium*, *Trichosteleum* and *Warburgiella*. *Journal of the Hattori Botanical Laboratory* 95:1–69.

Ramsay HP, Streimann H & Vitt DH (1995) Cytological studies on some mosses from Papua New Guinea I. Introduction and family Orthotrichaceae. *Tropical Bryology* 11: 151–160.

Ramsay HP & Vitt DH (1984) Distribution, cytotaxonomy and sexuality of *Macromitrium* in the Pacific. *Journal of the Hattori Botanical Laboratory* 55: 23–33.

Ramsay HP & Vitt DH (1986) The *Macromitrium* complex in Australasia (Orthotrichaceae, Bryopsida) Part III. Cytotaxonomy. *Journal of the Hattori Botanical Laboratory* 61: 1–43.
Reese WD & Stone IG (1995) The Calymperaceae of Australia. *Journal of the Hattori Botanical Laboratory* 78: 1–40.
Sainsbury GOK (1948) Synonyms of some New Zealand mosses. *Revue Bryologique et Lichénologique* 17: 79–85.
Scott GAM & Stone IG (1976) *Mosses of Southern Australia.* (Academic Press, Cambridge)
Seppelt RD (1982) A monographic revision of the genus *Ditrichum* (Musci: Ditrichaceae). 1. Australian and New Zealand species. *Journal of the Hattori Botanical Laboratory* 52: 99–150.
Shaw AJ & Beer SC (1999) Life history variation in gametophyte populations of the moss *Ceratodon purpureus* (Ditrichaceae). *American Journal of Botany* 86: 512–521.
Shaw AJ & Goffinet B (2000) *Bryophyte Biology* (Cambridge University Press, Cambridge)
Shimotomai N & Kimura K (1934) Geschlechtschromosomen bei zwei Laubmoosen. *Botanical Magazine Tokyo* 48: 385–391.
Smith AJE & Ramsay HP (1982) Sex, cytology and frequency of bryophytes in the British Isles. *Journal of the Hattori Botanical Laboratory* 52: 275–281.
Sollman P (2002) Further studies on some Australian pottiaceous mosses. *Lindbergia* 27: 127–128.
Stone IG (1961a) The highly refractive protonema of *Mittenia plumula* (Mitt.) Lindb. (Mitteniaceae). *Proceedings of the Royal Society of Victoria* 74: 119–124.
Stone IG (1961b) The gametophore and sporophyte of *Mittenia plumula* (Mitt.) Lindb. *Australian Journal of Botany* 9:124–150.
Stone IG (1978) *Tortula oleaginosa*, a new moss from Australia. *Journal of Bryology* 10: 117–124.
Stone IG (1980) *Phascopsis rubicundis*, a new genus and species of Pottiaceae (Musci) from Australia. *Journal of Bryology* 11: 17–31.
Stone IG (1984) *Uleobryum curtissii* (Pottiaceae) from Queensland, Australia. *Journal of Bryology* 13: 19–24.
Streimann H (1991) Taxonomic studies on Australian Meteoriaceae (Musci) 1. Introduction and the genus *Papillaria*. *Journal of the Hattori Botanical Laboratory* 69: 203–206.
Streimann H (1997) Taxonomic studies on Australian Hookeriaceae (Musci). 1. Introduction and the genera *Achrophyllum, Callicostella, Chaetomitrium*, and *Cyclodictyon*. *Journal of the Hattori Botanical Laboratory* 82: 281–304.
Streimann H (2002) *The Mosses of Norfolk Island* (Australian Biological Resources Study, Canberra)
Streimann H & Klazenga N (2002) *Catalogue of Australian mosses.* Flora of Australia Supplementary series 17. (Australian Biological Resources Study, Canberra)
Tangney RS (1997a) A taxonomic review of *Cauptocluaete* Reichdt Lembophyllaceae (Musci) *Journal of the Hattori Botanical Laboratory* 81: 53–121.
Tangney RS (1997b) A taxonomic revision of the Lembophyllaceae. *Journal of the Hattori Botanical Laboratory* 81: 123–153.
Tangney RS (2008) A review of *Lembophyllum* Lindb. (Bryopsida: Lembophyllaceae). *Journal of Bryology* 30: 41–47.
Touw A (1971) A taxonomic revision of the Hypnodendraceae (Musci). *Blumea* 19: 211–354.
Touw A & Falter-van den Haak L (1989) A revision of Australasian Thuidiaceae (Musci), with notes on species from adjacent regions. *Journal of the Hattori Botanical Laboratory* 67: 1–57.
Tropicos (2011) Missouri Botanical Garden http:/www.tropicos.org. (accessed July 2011).
Vitt DH, Goffinet B & Hedderson T (1998) The Ordinal classification of the mosses –questions and answers. Pp. 113–124 in Bates JW, Ashton NW & Duckett JG (eds) *Bryology for the Twenty First Century.* (British Bryological Society, U.K.)
de Vries A, Bramer PJP, zan Zanten BO, Hofman A & Bijlsma R (1989) Allozyme variation in populations of four *Racopilum* species, including the polyploid *R. tomentosum*. *Lindbergia* 15: 47–59.

Watts WW & Whitelegge T (1902) Census muscorum Australiensium. *Proceedings of the Linnean Society of New South Wales* 27(Suppl.): 1–90.

Watts WW & Whitelegge T (1906) Census muscorum Australiensium. *Proceedings of the Linnean Society of New South Wales* 30(Suppl.): 91–163.

Yamaguchi T (1993) A revision of the genus *Leucobryum* (Musci) in Asia. *Journal of the Hattori Botanical Laboratory* 73: 1–123.

Zander RH (1977) The tribe Pleuroweisieae (Pottiaceae, Musci) in middle America. *The Bryologist* 80: 233–269.

Zander RH (1993) Genera of the Pottiaceae: mosses of harsh environments. *Bulletin of the Buffalo Society of Natural Science* 32: 1–378.

Zanten BO van (2006a) A synoptic view of the Racopilaceae (Bryophyta, Musci) I. Asian, Pacific and Australasian species of the genus *Racopilum*. *Journal of the Hattori Botanical Laboratory* 100: 527–552.

Zanten BO van (2006b) Racopilaceae. Pp. 371–376 in McCarthy PM (ed.) *Flora of Australia*, vol. 52 *Mosses* 1. (Australian Biological Resources Study, Canberra)

Manuscript received 03 May 2010, accepted 12 August 2011

Instructions for Authors

Telopea is published twice a year. It covers systematic botany in Australia and the Asia-Pacific region specialising in the flora of New South Wales. Short Communications are welcome (see previous issues for format).

Deadlines for the submission of papers for the next two issues can be found at http://plantnet.rbgsyd.nsw.gov.au/Telopea/auth.php.

Authors are expected to have their papers peer-reviewed before submission. All papers will be refereed. Supply full contact details for main author. Electronic submission is preferred; please see http://plantnet.rbgsyd.nsw.gov.au/Telopea/auth.php for more detailed instructions on submission.

Formatting

- The title should be explicit and descriptive of the content; a short running head and an abstract (except for Short Communications) should be included.
- Check most recent issue for format. The Macquarie Dictionary, latest edition, and the Style Manual for Authors, Editors and Printers, latest edition, should be consulted for spelling, abbreviations, units and other conventions.
- References in the text should be made by giving the author's name with the year of publication in parentheses. For reference list at end of paper see papers in the latest issue for style. Titles of journals should be given in full.
- An index to taxa is useful if the paper is large and deals with many species and synonyms. The author should prepare the basic alphabetic listing including all names in recent use.

Citations

- Cite Type details in full, giving details from protologue and from specimen label separately if there are important differences. Type citations should be in a consistent format, e.g: Type: New South Wales: North Western Plains: 10 km W of Moree (29°08'S 129°48'E), B. Wiecek 1250, 2 Jan 1989; lecto NSW (Weston 1990: 21); isolecto K, MO.
- Cite no more than 20 (except for very widely distributed species) and arrange by Botanical Divisions. Use accepted format: locality, collector & number, date (herbarium code plus institutional number if there is no collector's number) Only latitudes and longitudes on the original labels should be included. Give dates in the following format: 12 Jan 1987, 2 Jun, 30 Jul, 10 Dec etc.

Supply of Artwork

- In the finished journal, we do not allow figures to extend beyond the journal margins.
- Captions and scale bars for figures should be checked against the artwork for consistency. If scale bars or lettering need to be added, they should be clearly marked on a photocopy of the artwork. Measurements of scales bars should be provided in millimetres. The use of 'Times magnification' for scale is discouraged because layout can affect final size.
- Line Art @1200 dpi, Greyscale Art @300dpi resolution in eps or tiff format please — cdx, pict, bmp, wmf will not be accepted. Authors wishing to submit other types of files will need to contact the General Editor.
- Files from ArcView 3.1 are acceptable if exported from the layout as Postscript New (eps) at 720 dpi resolution. This must be specified in the options box.
- At the above resolutions, graphic file size will usually exceed 1.2 Mb and therefore will not transport via email or on a floppy disk. Please supply graphics either on a 100 Mb zip disk or burnt to 650 Mb CD. Macintosh platform preferred.
- Graphics embedded in Microsoft Word, Excel and PowerPoint will not be accepted. Items should be saved in the graphic formats tiff and eps as for Line art and Greyscale art.

Artwork supplied as hard copy only

- Artwork supplied should be no larger than A4 (21 cm wide). Any larger images should be brought to the attention of Scientific Editor to see if they need to be outsourced or reduced.
- Hard copy Artwork should be complete and legible as no changes to hard copy artwork can be made post scanning. Any images requiring special treatment (eg old maps) should be brought to the attention of the Scientific Editor prior to acceptance of the paper.

Tables

- Tables should preferably be portrait rather than landscape shape (i.e. taller rather than wider). Column headings should be brief. Each table must be referred to in the text and its approximate position should be indicated in the margin of the manuscript.

Dedication

The current issue of Telopea is dedicated to the staff and students of the South Pacific Regional Herbarium (Institute of Applied Sciences, the University of the South Pacific), particularly Alifereti Naikatini and Marika Tuiwawa, who have provided the tireless and enthusiastic logistical and fieldwork support essential to many of the papers in this issue.